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MOTOR AGE

FOR AUTOMOTIVE SERVICEMEN



A CHILTON PUBLICATION



LITTLE BUT MIGHTY

IN WAR AND IN PEACE

● Alongside a giant gun a piston ring looks insignificant. Yet both are necessary — to winning the war. Consider, for instance, that the simple installation of a set of Steel-Vent piston rings can be counted on to restore performance and economy in a worn motor—for many more thousands of miles.

Consider also that these rings are available in thousands of cities and towns—for every emergency or normal need.

HASTINGS MANUFACTURING COMPANY, HASTINGS, MICHIGAN
Hastings Mfg. of Canada, Ltd., Toronto
PISTON RINGS • PISTON EXPANDERS • VALV-RINGS

TOUGH...BUT OH SO GENTLE



HASTINGS

STEEL-VENT PISTON RINGS

U. S. Patent Nos. 2,148,997, 2,175,409

Tough on oil-pumping. Gentle on cylinder walls.

IT PAYS () TO BABY RADIATORS

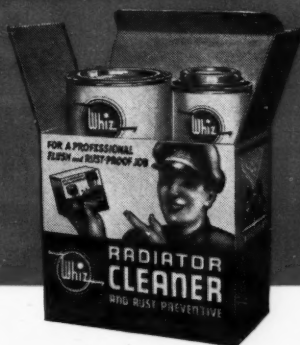


RADIATOR SPECIALTIES

Here are three fast-selling WHIZ specialties . . . for spring cleaning . . . for guarding against rust and corrosion . . . and for stopping leaks. Every one of your customers has a radiator which must be kept in good condition for the duration. Help them . . . and help your business and profits . . . with these quality products of Hollingshead, leader in maintenance chemicals. R. M. Hollingshead Corp., Camden, N. J.; Toronto, Can.



Commando Rust Preventive stops and prevents rust and corrosion and minimizes clogging. An excellent internal lubricant for water pumps. Non-injurious. Works with anti-freeze, hard or soft waters, high-chemical-content waters.



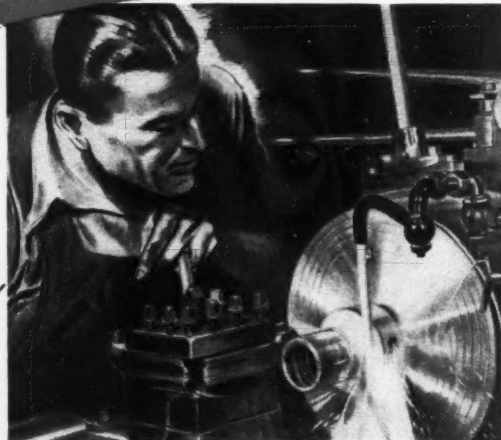
WHIZ KIT No. 48

- 1. Whiz Radiator Cleaner** loosens and removes rust, sludge, scale and other foreign materials from the cooling system—prevents overheating.
- 2. Whiz Rust Preventive**—used following the Cleaner—protects the cooling system's internal surfaces against rust, scale and corrosion.



Whiz Radiator Solder stops leaks instantly, seals them permanently. Will not clog honeycomb or modern small core radiators. Guaranteed non-injurious to aluminum heads or fittings, rubber, gaskets, or any other cooling system part. Works with any anti-freeze.

*Why this man wants genuine
Timken Bearings
in his Automobile*



He owns an automobile. You're interested in him for that reason. The fact he runs a lathe has no particular business significance for you. *Or does it?*

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THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Service-sales Division

"All There Is In Bearings"

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

"Original efficiency" takes on significance when you can't get a new car. That's what only genuine Timken Bearing replacements assure.

MOTOR AGE

With Which is Combined AUTOMOBILE TRADE JOURNAL

FOR AUTOMOTIVE SERVICEMEN

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April, 1943

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MOTOR AGE

APRIL 1943

EDITOR'S SHOP TALK

by

Bill Toboalt



Spring

The old automotive spring song of "get the car ready for the big mileage season of spring and summer" would be a little off key this year, with the government making every effort to control mileage. Furthermore, there are not enough mechanics to do the routine work of today. However, this spring does call for certain specialized work that should be done on each car in order to keep it operating and playing its part in the transportation system of the country. Read this issue carefully. It's important to you and the nation as a whole.

Drinks on Me

When it comes to slapping a guy down, I want to recommend my old friend, Cliff Oppel, and my sparring partner from North New Jersey, as doing a super-duper job. First, New Jersey, and then Cliff—it was the old one-two and I went down for the count. The trouble all came about the advice I gave Delos Thaler in Hart, Mich. Delos was having trouble with a lot of water in the gas and I told him the car owner might have

gotten a load of it at some filling station. Both Cliff and N. J. say the major cause of water in gasoline is condensation of moisture right in the tank on the car. Obviously that's true and that's the answer I should have emphasized instead of ignoring it. However, while I know better, I'll still have to buy the drinks on that one.

Oil Surge

Instead of using a 12-lb. sledge, the way Oppel and N. J. do, L. V. Webster in Moline, Ill., uses a soft hammer with finesse and dexterity when differing with a diagnosis of an oil leak described in the January issue. The trouble, says Webby, might be caused by the front of the engine being too low, which would permit the oil to surge out of the pan on sudden stops.

But 12-lb. sledge or ½-lb. soft ham-

mer, it's all one to me. To paraphrase an old statement, I don't care what you write me, just so you write.

Gas Guesses

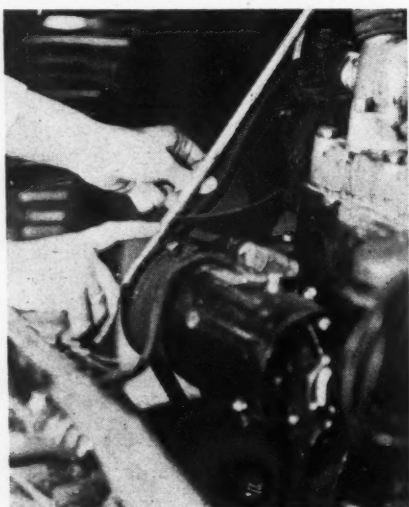
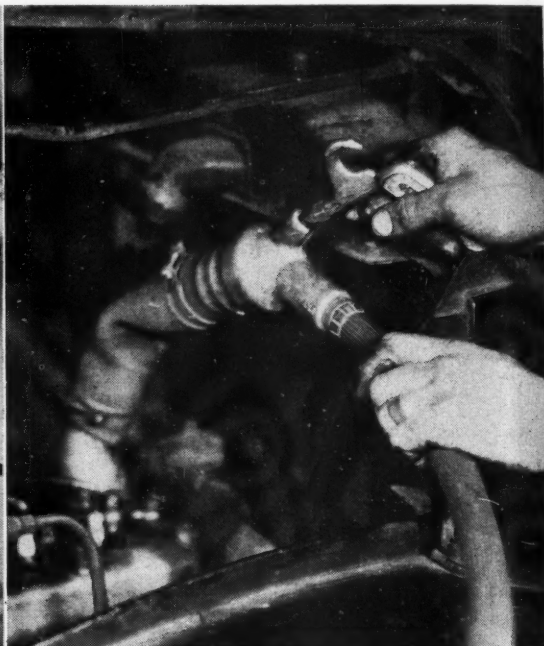
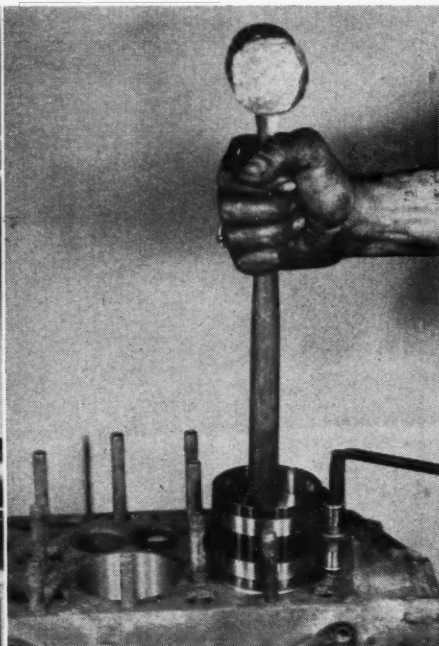
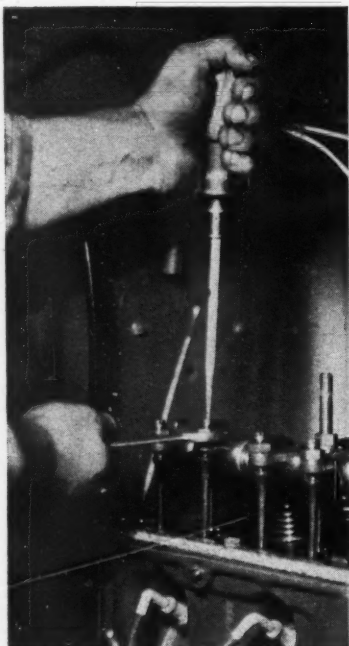
Trying to figure out what's going to happen in gasoline rationing is a tough assignment. In Washington, there are as many guesses as there are bureaucrats—and that's more than I'd like to sit down and count. Of course, these guesses come under two general heads—(a) that the value of gas ration coupons will be increased—(b) that they will be decreased. Maybe the wish is father to the thought, but one of the guesses I like the best—and one which I hear the most—is that Western coupons are due for a boost along about July and Eastern "A" coupons will be returned to the three gallon-two month value about the same time.



SPRING TUNE-UP FOR WARTIME



Mechanics of limited experience can handle many of the jobs needed now to improve economy and insure longer car life

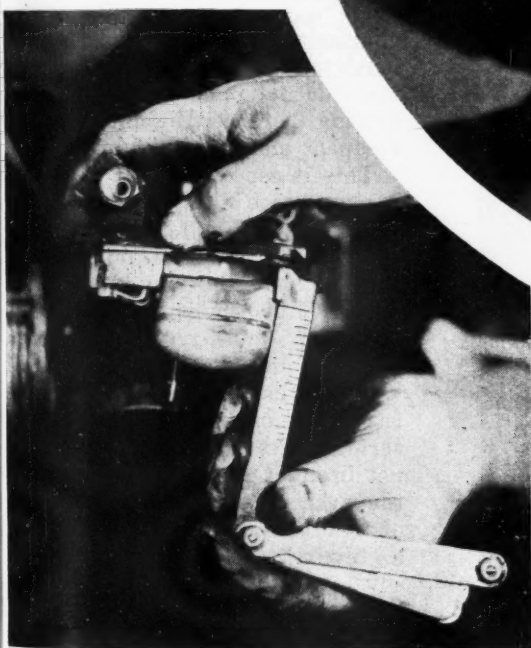
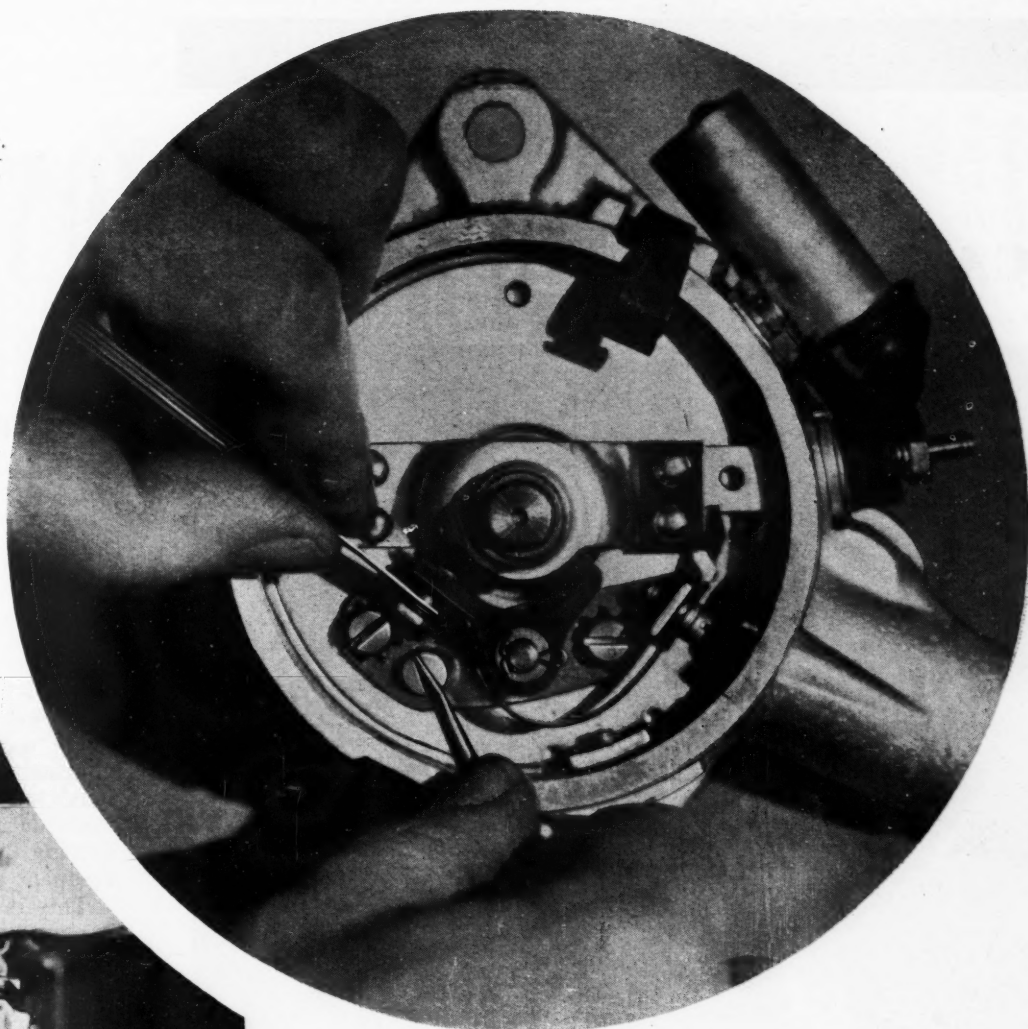


WITH car owners standing in line waiting their turn to have some work done on their cars, some shop owners may think it unnecessary to make any plans for a spring service campaign.

While it may not be necessary to make any plans on ways and means of increasing the volume of business, it is necessary to plan what work is the most essential at this time and what services will help the war effort the greatest.

First of all, there is a lot of service work which can be per-

formed by helpers or apprentice mechanics which will prolong the life of the car, improve gasoline mileage and yield a good profit to the shop owner. Chief among such operations is that of lubrication. While this is discussed at length in another article in this issue, it may be well to emphasize that, while many car owners believe that crankcase draining is unimportant at this time because of restricted mileage resulting from gasoline rationing, actually it is more important than ever before.



By BILL TOBOLDT

The reason for this is that, with reduced driving, crankcase dilution and its corroding effects on crankshaft, bearings, and wrist pins will increase rapidly, as the engine is not driven at operating temperatures for long enough periods to evaporate the diluent. It is, therefore, essential that the crankcase be drained, flushed and refilled not only at this particular season but frequently throughout the year.

Another important job at this season and which can be performed

by the apprentice mechanic is the draining and flushing of the cooling system. If the space and the necessary containers are available, some service-station operators may wish to store the permanent anti-freeze which is drained. Naturally, this would be an additional service for which an extra charge should be made. It might be well to encourage such a campaign, as it is entirely possible that anti-freeze may be even more scarce next season than it was last and, in that event, many cars would have to be stored

throughout the winter season with the result that transportation would be seriously affected and repair-shop profits decreased. However, particular attention must be given to flushing the cooling system this year for, if there is any indication that calcium chloride was used as an anti-freeze, both water jacket and radiator core must be flushed with boiling hot water for at least one hour. That is necessary to remove all traces of the chemical which, if not removed, would soon

(Continued on page 58)

CAR-SAVING LUBRICATION



Spring change-over more important than ever if cars are to keep rolling

continuous and satisfactory operation, and owners are easier than ever to convince that the spring change-over is vital to any maintenance program. However, most of them do not realize that restricted driving increases the importance of frequent and regular lubrication.

This is especially true of changing crankcase oil. With almost three fourths of the country's owners restricted to A rations, millions will drive six months to a year before putting 1,000 miles on their speedometers. Their trips will be less frequent and shorter. They will be using the choke oftener, and crankcase dilution will increase. One serious effect of dilution, and one not brought home often enough to the average owner, is the etching of crankshaft journals and other highly finished parts. The only remedy is regular oil changes regardless of mileage. In other words, lubrication by the calendar instead of by the speedometer.

It is not enough simply to drain the oil when changing the crankcase lubricant. The whole lubrication system must be cleaned, preferably with a flushing unit if one is available, or with a good flushing oil. If neither is to be had, use SAE 10 or 10W, filling the crankcase to half its normal capacity and flushing by running the engine a little faster than idling speed for about 10 minutes. Then remove the drain plug before the foreign matter in the oil has a chance to settle. On models that use an oil strainer in connection with the plug, it is advisable to clean the strainer.

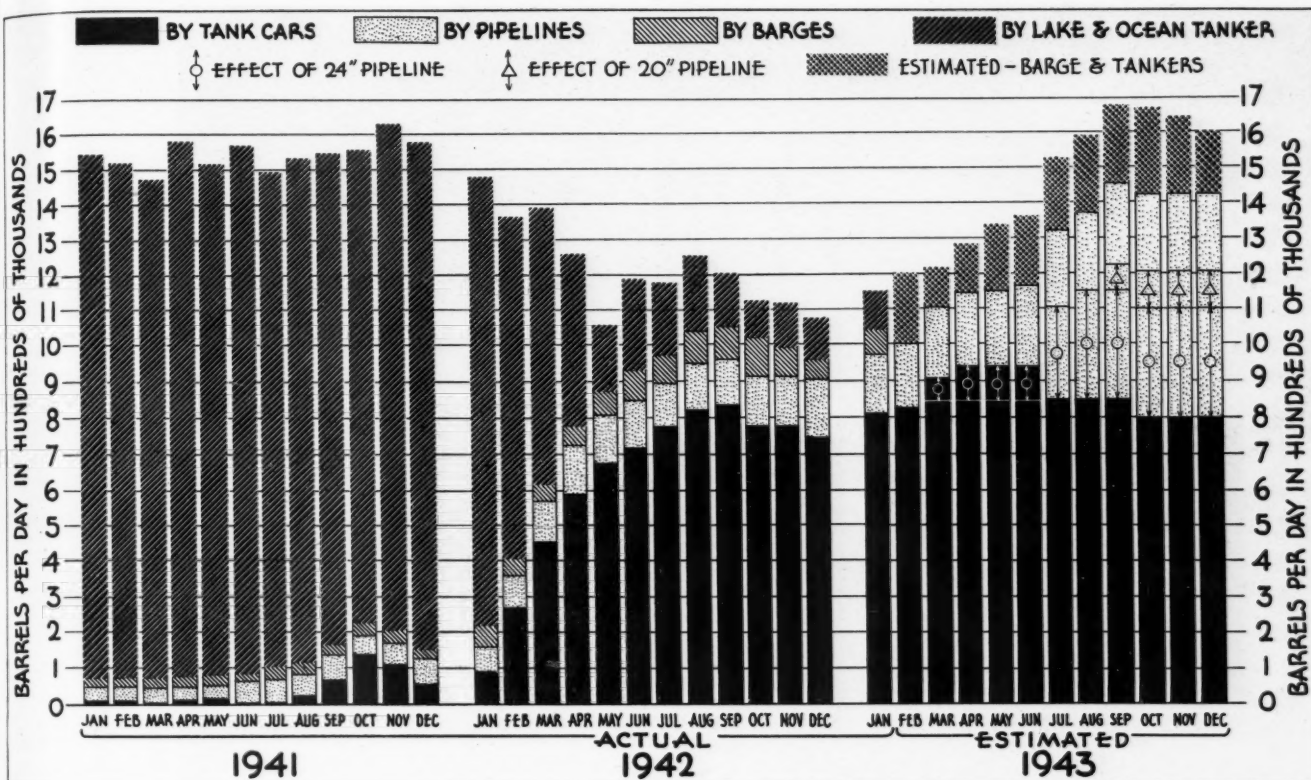
It is worth noting that the 35
(Continued on page 48)

EACH spring for years, car owners have read and heard about the importance of changing over to summer lubricants. Some of them took the advice to heart; others remained completely indifferent to the serviceman's most persuasive arguments.

This year owners have been conditioned by the hard realities of war to accept advice on lubrication

at its face value. A year without the production of a single civilian passenger car has made replacement impossible except for a comparative handful of owners. Material scarcities have left repair shops overburdened with work, with the result that major repairs are often a source of delay and inconvenience.

Proper maintenance is the only assurance that cars can be kept in



Delivery of petroleum into 17 Atlantic Coast states, as charted by the Petroleum Industry War Council. Last 11 months of 1943 are estimated.

EASTERN OIL DELIVERIES TO REACH NEW HIGH

**Amazing progress in transportation
methods indicates supplies by end
of year will surpass pre-war peak**

BEFORE the end of the present year, more petroleum and petroleum products will be flowing to the East Coast than at any time before the war.

This amazing fact is shown clearly by the chart recently released by the Petroleum Industry for War. The improvement in supply is being made possible by the success of the industry in completely revolutionizing its transportation methods.

Before the war, the chart reveals, more than 1,500,000 barrels of oil a day were delivered to the East Coast, 95 per cent of the total being carried in ocean tankers. By the end of 1943, if present plans mature, a total of 1,600,000 barrels a day will be delivered, practically none of it by the ocean route.

Before submarines menaced the sea route, railroad tank cars played an insignificant role in petroleum transportation. As the chart shows,

the quantity of oil carried over rails increased rapidly during 1942 and, in January of this year, totaled slightly more than 800,000 barrels a day. The importance of ocean-going tankers diminished steadily throughout last year and, in January this year, had shrunk to only 100,000 barrels a day.

Pipelines, though destined to play an increasingly important part in the picture, were not delivering a great deal more oil in January this year than they were before the war. But this condition is only temporary. The Big Inch line from Texas to Philadelphia and New York is expected to be completed in the next few months, and priorities already have been asked for materials to build a 20-in. line over a parallel route. The second line would be completed as far as Indiana this year, and the oil carried by this line would be forwarded east by rail. Its extension to the coast next year would add to the 1,600,000 barrels daily estimated as the maximum for this year.

The Petroleum Industry War Council, in releasing the chart, emphasizes the fact that bigger deliveries of petroleum and products to the East cannot be expected to increase civilian supplies, as mili-

(Continued on page 86)



"Larry made me feel old," said Horace, "talkin' about adjustin' front ends on modern cars. It was over my head."

HORACE Watkins was slipping into his shop coat when Pop O'Neill, returning from lunch, stepped out of his coupe and started for the office. "Back early today, ain't you?" Pop asked.

"Yeh," said Horace. "Nobody home today, so I went over to the wagon with Larry. And I wish I hadn't."

By J. Edward Ford

"They serve the best scorched potatoes in town," said Pop, "and their stew's all right—if you like soup."

"I wasn't thinkin' about the grub. I can get used to that, I guess. What burns me up is to

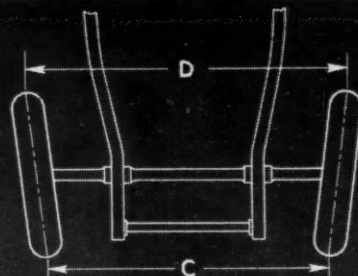
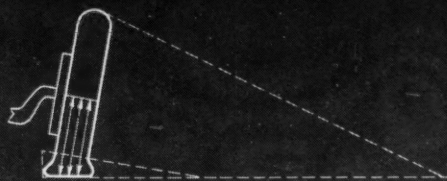
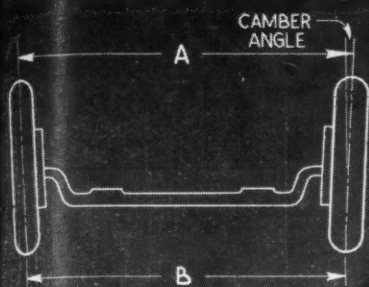
have somebody make cracks about my age."

"Larry been needlin' you?"

"Said if I was a woman I'd still be wearin' hoop skirts."

"The standard comeback to that kind of a crack is that a man's only as old as he feels."

"But Larry made me feel old. Started talkin' about adjustin' front



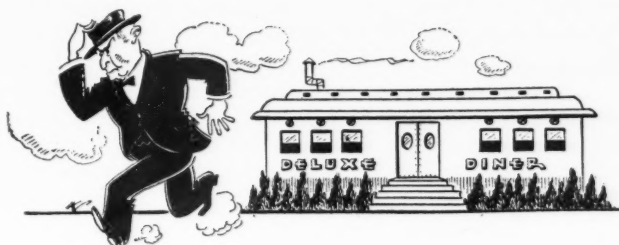
Distance "A" is greater than distance "B", the difference being the camber in inches. Camber also may be expressed in degrees.

Cambered, a wheel is a segment of a cone. Outer edge of the tire will try to turn more times per miles than the inner edge.

A cambered wheel tends to roll in direction it is tilted. To overcome this effect, the wheels are toed-in at front, as shown here.

LINING UP FRONT WHEEL FACTS

Pop O'Neill, in the 17th article of an instructive series, brings a new helper up-to-date on wheel aligning



ends on these modern cars and it was clean over my head. The worst of it is, I was adjustin' front ends before Larry was born."

"There ain't no mystery about wheel alignment once you get straight on the theory."

"That's the trouble," said Horace. "I don't remember much theory no more. I'm gonna be in a spot some

day if one of the younger fellows lays off and you want me to help out with a wheel-alignin' job."

"Are you hintin' around for a little instruction?"

"Well, you might put it that way," admitted Horace.

"O. K.," said Pop. "I'll tell you what I'll do. Stick around after quittin' time tonight. If you're

still interested, we'll get together for a lesson."

Pop was as good as his word, and, when Horace entered the office after punching the clock that evening, Pop had several open instruction books spread on the top of the desk. "Where'll we start," he asked, "right at the beginnin'?" "I guess we'd better," said Horace. "Larry was shootin' a lot o' terms at me like steerin' geometry and tangents and obliqueness. All I know for certain is that there's three things to worry about—caster, camber, and toe-in. From there on, I'm rusty."

"Sit down, then and we'll start you in the kindergarten, then," said Pop. He shuffled through the books on the desk until he came to one that was unusually well-illustrated. "Take a look at that head-on view of a front end. In this illustration here, you see that the tops of the wheels lean outward—like a cowboy's knees. That's camber. Now, over here in the next picture, you see that the wheels are closer together at the front than at the back. That's toe-in. Then in this

(Continued on page 54)





SAVE YOUR JACK

**Hints on the care and lubrication
of a unit that is hard to replace**

YOU are engaged in one of the most vital of all industries—The Maintenance of the Vehicles that Comprise the Largest Method of Transportation in this Country. To contribute your full share to the solution of the transportation problem you must keep your shop equipment in good working order, as you will not be able to replace it for the duration of the war. One of the items of equipment in your shop that will be virtually impossible to replace is the garage jack. A few simple operations, if per-

formed regularly, will maintain such equipment in good working order.

The first step in the proper care of a garage jack is to keep it clean and well-lubricated. To prevent unnecessary wear to the unit, it should be periodically washed and all parts subject to wear should be thoroughly lubricated.

When using the jack, be certain that the load is always centered on the jack saddle. This will prevent unnecessary strain on the jack and prevent damage to the unit and ac-

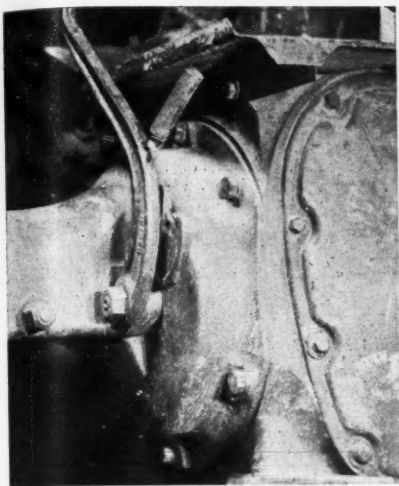
cidents resulting from the load tipping. The load should be raised only high enough for the particular job or to place a stand under the load. When the jack is not in use, it should be lowered and moved to a place in the shop where it will not be struck by moving vehicles or damaged in other ways. Keep the jack painted to prevent rusting. Never lift a load greater than that for which the jack was designed.

When lowering a mechanical jack, never start the load bouncing and the handle swinging free as this practice invariably results in premature wear and bent or broken parts. Never leave the handle of the jack in a straight-out position on the floor. This is a sure way to get the handle broken off by a car running over it.

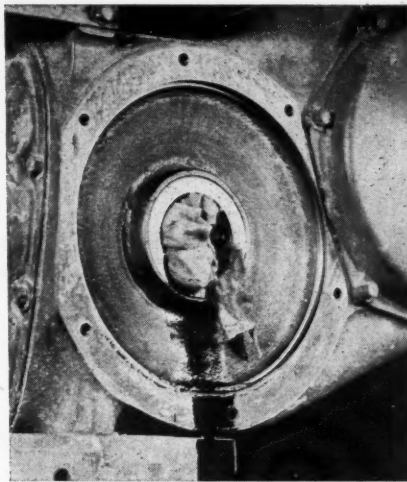
A hydraulic jack should be inspected at regular intervals and all joints lubricated and the oil level checked. The oil should be maintained at the proper level at all times. Use only the oil recommended by the jack manufacturer for this purpose as oils of different viscosity than those recommended will cause faulty operation of the unit. Brake or shock-absorber fluid will cause the jack to become inoperative after a short time as such fluids will attack the leather cups and cause them to rot. The jack should be drained and washed out if fluid of this kind has been used and the jack refilled with the proper oil.

Probably the most frequent cause of trouble in hydraulic jacks is due to particles of dirt lodging under the suction and pressure check valves. This trouble may be remedied by draining the oil and washing out the jack with a suitable cleaning fluid to remove these particles. If the valves still do not seat after washing out the jack and the valves are of the ball type, they may be reseated by placing the ball on its seat and tapping the ball lightly with a ball peen hammer. Piston and plunger-cup washers should be examined and replaced when necessary. All packing nuts should be kept just tight enough to prevent leaks and to keep air from entering the cylinder. Make sure that the air vent is open on floor-type jacks.

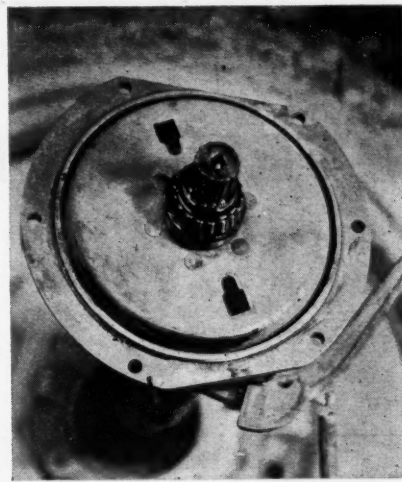
If, after performing the foregoing operations, the jack still fails to operate properly, it should be returned to the manufacturer's nearest authorized service station or to your jobber, who will be in a position to have any major work done which the unit may require.



1. Brake drum and shoes are located inside the axle tube next to the differential case.



2. Remove the bolts holding the axle tube to the differential case and remove the tube and axle as an assembly.

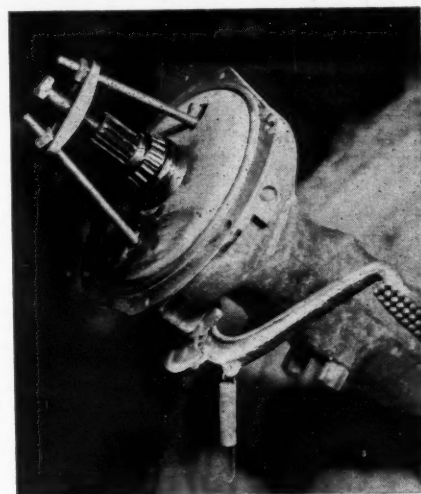


3. Wheel, axle tube, brake drum and differential side bearing are removed as a unit.

TRACTOR BRAKE

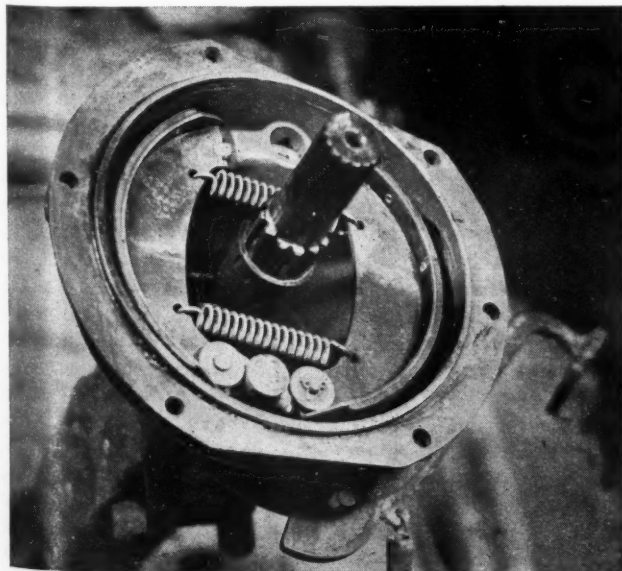
SERVICE

A picture sequence that shows how to do a faster brake job on a Model H John Deere

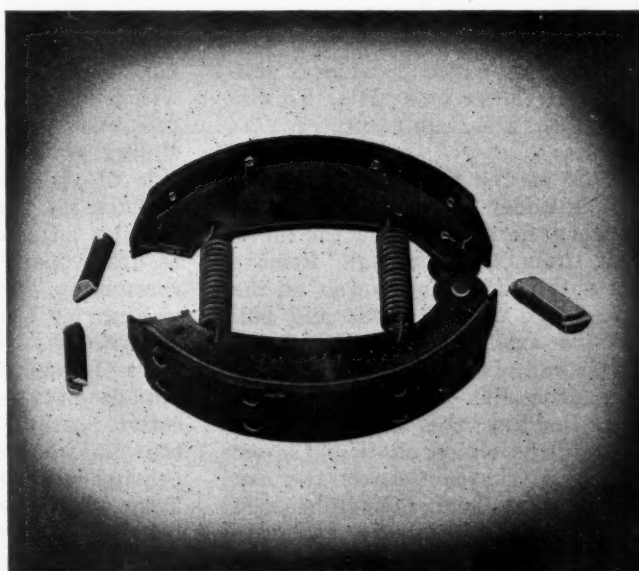


4. Differential bearing and brake drum are removed from the axle shaft with a puller. Slots are provided in the brake drum to accommodate square-head bolts.

5. After the brake drum is removed from the shaft the brake shoes are exposed. To remove the shoes pry the shoes out of the slots in the adjuster shafts and pull them out of the housing.



6. Brakes shoes, adjuster shafts and operating wedge assembly. Shoes may be relined and operating shaft and adjusters freed up and lubricated.



OVERHAULING

DUAL PERFORMANCE



Model 1350 Axle Used on G.M.C.
CC-300-350-400 CF-300-350-400
CCT-350-400 CFT-350-400

Model 16050 Axle Used on G.M.C.
CC-450 CF-450 CCS-450

By BOB TURNER

THE two-speed dual-performance rear axle is a modification of the conventional bevel-gear axle and incorporates a set of planetary gears and a sliding clutch gear between the ring gear and differential. This permits changing instantly from a high axle ratio to a low ratio or vice versa to suit load and road conditions.

In high axle-speed, the planetary gears are locked and the entire differential assembly operates in the conventional manner. In low axle-speed, the differential and axle shafts are driven through the planetary gears, which provides a substantially lower axle ratio. To disassemble this unit proceed as follows:

Jack up the rear axle and place stands under the axle housing to support the rear. Drain the lubricant from the housing. Remove the nuts and driving dowels on the axle-flange driving studs and pull out the axle shafts. Take off the hubs and bearings and protect them from dirt. Take out the flange bolts holding the rear universal joint to the pinion shaft and lower the drive shaft. Remove the cap screws that hold the differential carrier to the housing and remove the carrier assembly. Clean the

unit thoroughly and move it to the bench for disassembly.

First remove the oil-distributor plug on front of the carrier where the pinion-shaft bearing retainer bolts to the housing. After the plug is removed, the spring and distributor are exposed and can be removed. Remove the bolts attaching the shifter fork cover to the differential and take off the cover assembly. After the cover is off, take out the plunger, spring and pin. The shifter shaft was held in place by one of the cover screws previously removed and can now be lifted out. The shifter fork can now be withdrawn through the cover opening in the carrier. Remove the sliding clutch gear from the left side of the planetary unit.

Mark the right-hand differential bearing adjuster with a punch to assure proper adjustment when reassembling. Take out the differential carrier bearing cap lock wires on both the right- and left-hand sides. Loosen the bearing cap bolts but do not remove. Remove the cotter pin and adjuster lock from the right-hand side so that the bearing adjuster can be removed. Take off the left-hand differential bearing cap, adjuster and adjuster lock as an assembly to assure cor-

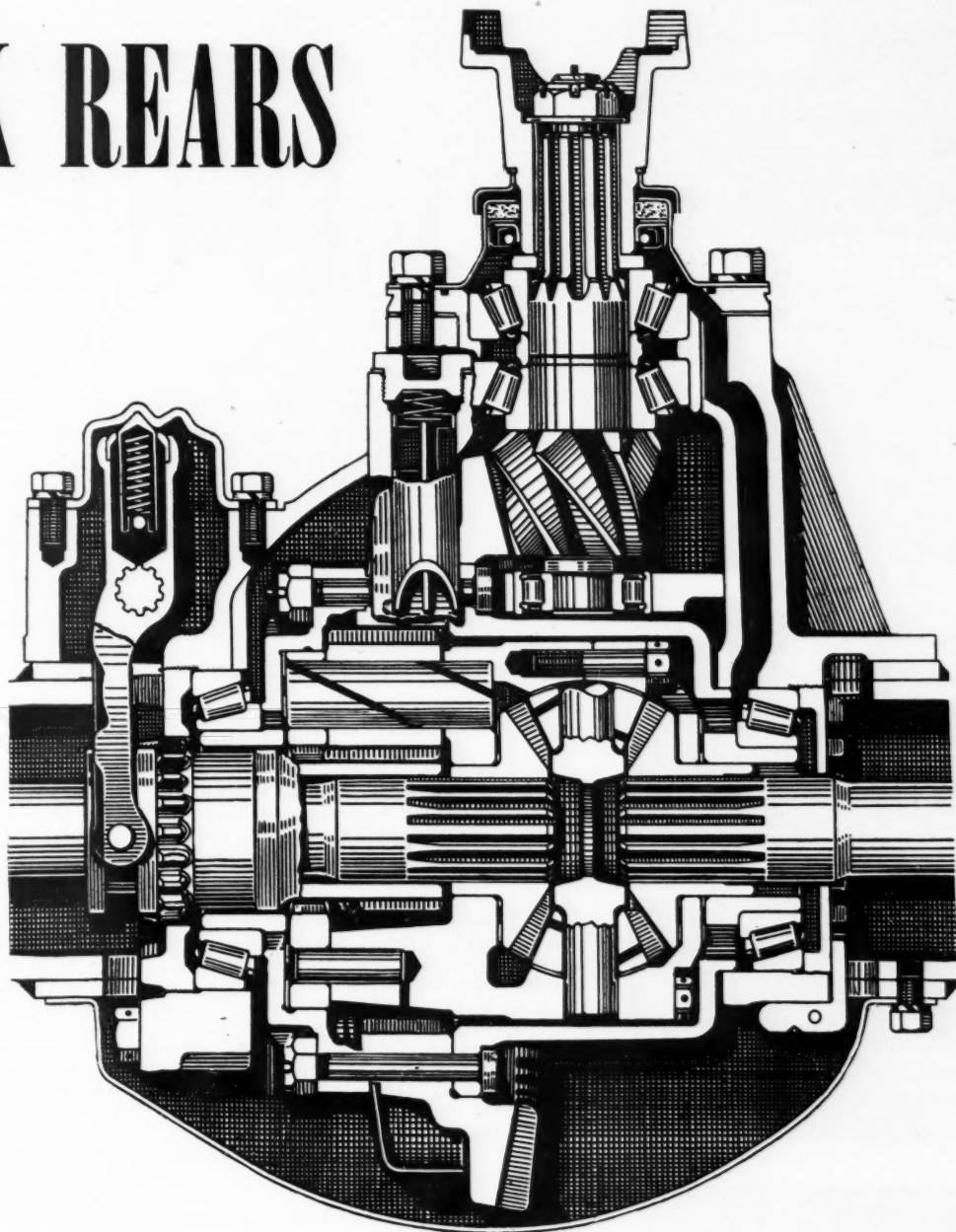
rect location when reassembling the unit. The complete differential and planetary unit can now be removed from the carrier.

Remove the nuts holding the pinion cage to the carrier and take out the pinion, bearings and cage as an assembly. There are two tapped holes in the flange of the cage through which bolts may be threaded to pull out the cage. The number and thickness of the shims between the cage flange and carrier should be noted so that the same number and thickness may be used when reassembling the pinion cage to the carrier.

To disassemble the pinion cage, remove the cotter pin from the nut holding the driving flange on the pinion shaft. Remove the nut and washer from the shaft. Press the pinion shaft out of the pinion cage, bearing cone, washer and yoke. Do not lose the spacer between the bearings. Remove the pinion oil seal and cover assembly. Clean the bearing cones and races thoroughly and inspect for chipped rollers or pitted races. If these conditions exist, the bearing should be replaced.

Inspect the pinion for chipped or worn teeth. If inspection shows that replacement of the pinion is

TRUCK REARS



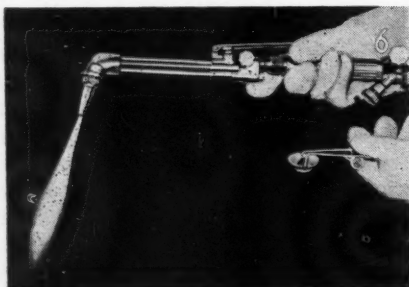
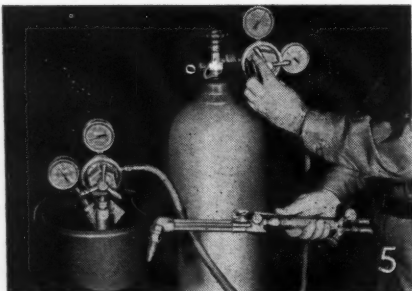
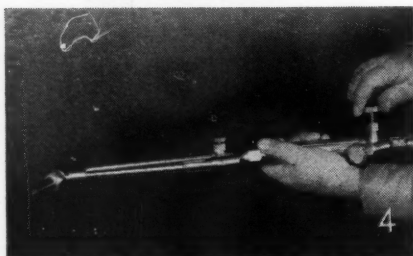
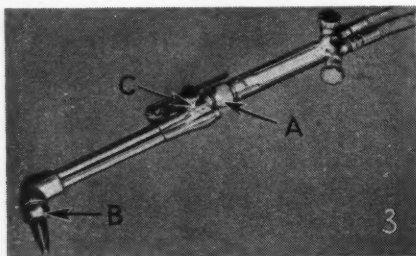
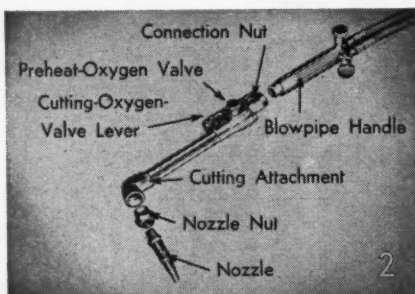
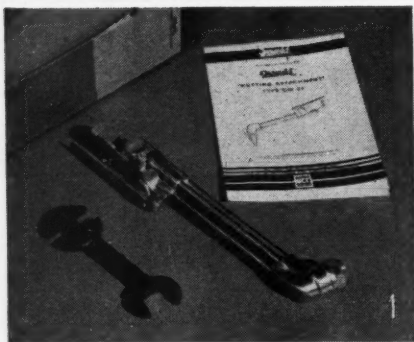
necessary, both the ring gear and pinion should be replaced to insure quiet operation of the gears.

To remove the planetary unit, take the cotter pins out of the support case bolts and remove the nuts from the bolts, the bolts can then be removed from the case. Tap the ring gear alternately on opposite

sides with a soft hammer until the gear is free of the flange on the support case. The left-hand support case, oil-collector ring, thrust washer and bevel gear can now be taken out of the right-hand support case. Pry the high-speed clutch plate from the idler pinions and pins with two screw drivers.

The entire differential assembly can now be lifted out of the right-hand support case. After the differential has been removed from the right-hand support case, take out the thrust washer that is between the differential case and the support case.

(Continued on page 62)



CUTTING WITH OXYGEN-ACETYLENE

For the type of cutting done in the automobile repair shop, the cutting attachment for the oxy-acetylene blowpipe can be used instead of a full-size cutting blowpipe. This series of photographs shows the proper way to assemble and use the attachment. Proper care of welding and cutting equipment in these days of material shortage is of utmost importance.

Photos courtesy the Linde Air Products Co.

1. The cutting attachment as it appears when removed from the container. In addition to the attachment itself, an instruction book and special wrench are included.

2. Close-up of attachment. It is designed to connect directly to welding blowpipe. Though not intended for sustained heavy cuts, it will cut sections up to 8 in. thick.

3. To assemble attachment. A. Re-sign to move welding head from blowpipe, attaching cutting unit and tightening connection nut by hand. B. Slide nozzle nut over nozzle and screw onto head, using wrench. C. Tighten valve-stem packing nut on preheat-oxygen valve.

4. Before lighting, open blowpipe oxygen valve as far as it can go. Valve must be kept open when cutting attachment is in use, as the flow of oxygen is controlled by cutting-valve lever and preheat-oxygen valve.

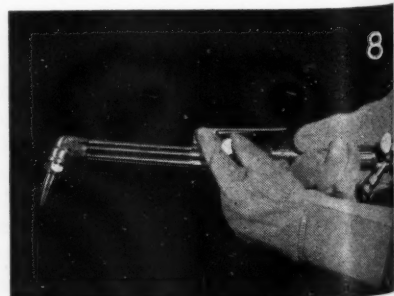
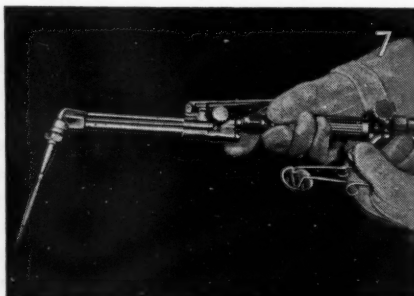
5. Open cutting-oxygen-valve lever by pressing down all the way. Turn in pressure-adjusting screw on oxygen regulator until gage indicates desired pressure. Release cutting-oxygen-valve lever. Turn in

pressure-adjusting screw on acetylene regulator until gage shows 5 lb. per sq. in.

6. To light, crack the preheat-oxygen valve about one eighth turn, and light preheat flames with lighter. Long, bright yellow preheat flames will result. Should leakage occur at connection, immediately turn off acetylene, then oxygen, and tighten connection.

7. Next, open preheat-oxygen-valve full turn, press down cutting-oxygen-valve lever all the way, and adjust preheat flames to neutral by means of blowpipe acetylene valve. If acetylene pressure should fall appreciably, turn in pressure-adjusting screw of acetylene regulator. To shut off blowpipe, release cutting-valve lever, then close blowpipe acetylene valve, and finally the preheat-oxygen valve.

8. After a backfire—a flame that goes out with a loud snap—the blowpipe can usually be relighted either on the work or with a lighter. Should flame flash back inside cutting attachment, immediately close preheat-oxygen-valve, then blowpipe acetylene valve. Blow oxygen through tip, and relight when blowpipe has cooled off.





A MANPOWER IDEA

FROM PEARL HARBOR

By **ROSE LU DE WINDT**

REPAIR shops in the Hawaiian Islands—where really acute labor shortages have existed ever since the attack on Pearl Harbor—have found a solution which can be adapted to the relief of such shortages here.

Immediately following the Dec. 7 attack, most skilled labor "turned to" on the tremendous repair job that faced the islands. Automotive repair shops—even those operated solely for military and naval ve-

hicles—found themselves too short-handed to meet demands.

Knowing there must be an answer to this problem, as there always is to every problem, service managers set out to find it. They realized that in every shop—on every job—there is a considerable amount of detail work that must be done but which does not require any special skill. The checking and changing of tires and batteries, the testing and adjustment of headlights,

pumping gasoline and changing oil, and countless other routine tasks certainly require no trained technician.

To do these jobs, Honolulu service stations have taken on groups of high school boys. In out-of-school hours and over week-ends, a group of just three or four boys can take care of all these jobs in a fairly large shop.

The schools today are emphasizing the importance of learning a trade, and you should have no trouble in getting boys who have been trained to some extent in the use and care of tools.

There are distinct advantages to hiring these younger boys rather than the older men who have been taken on by so many garages. A minimum of living expenses allow these youngsters to work for considerably less than can an older person. And they should be willing to work for less, for they are learning a trade as well as earning some cash.

You will find youngsters of this age eager to learn and easy to teach (psychologists say we learn faster at that age than at any other) as well as amenable to discipline. If you manage them well, they waste less time than older men.

1. Circuits of three-brush generator. Generators with adjustable third brush can be used without voltage regulator. Test by grounding field terminal.

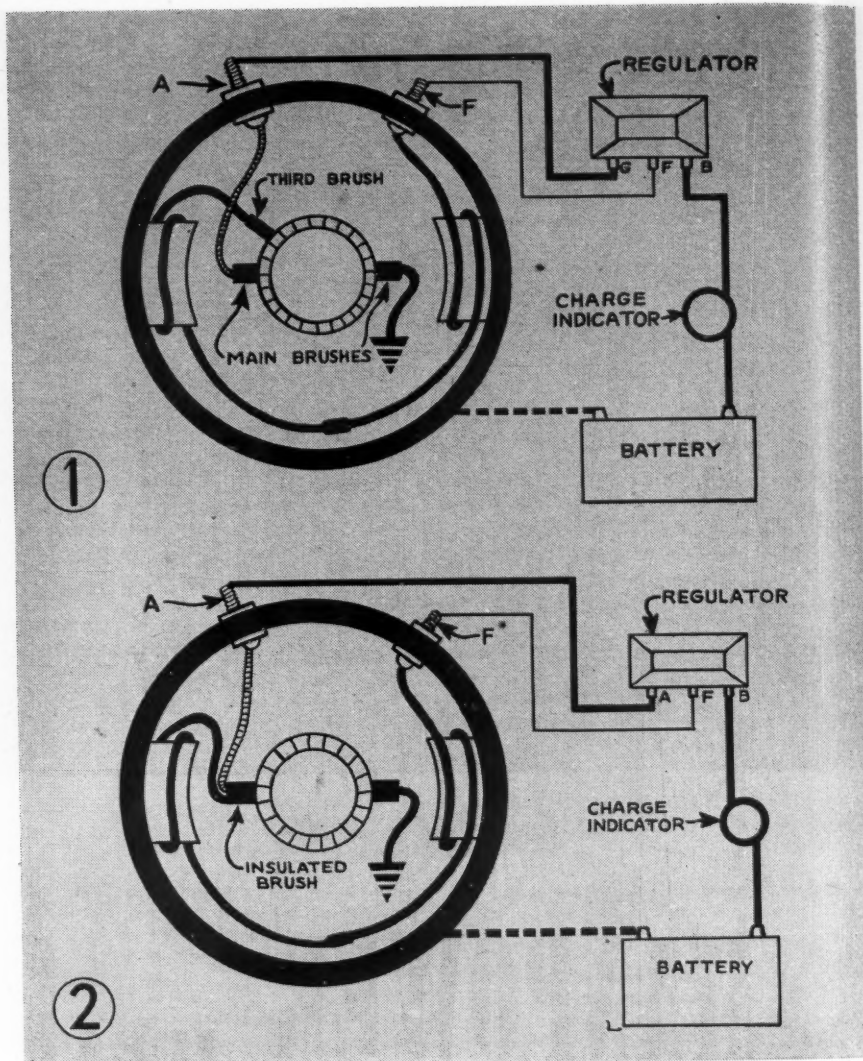
By FRED SLOANE

DUE to the manpower shortage, most of us are working under high pressure and a few minutes saved here and there can be used very profitably to handle an additional job. In many cases, the time required to remove and replace a suspected generator can be saved if a few simple tests are made, for it may be discovered that the generator is not at fault and need not be removed. On the other hand, a few easily made checks will often disclose minor faults, which if remedied in time, will save a complete "burn-out" a little later on.

Every mechanic knows that a "no charge" condition on a car does not necessarily mean that the fault is within the generator. There are quick ways of finding out if the generator is to blame, but a single method will not work on all types of generators for the simple reason that the internal circuits of all generators are not alike.

For a number of years back, most of the generators that employed external voltage control (a voltage regulator) could be made to charge to peak capacity merely by grounding the field (or F terminal) to the frame of the generator. This gave the generator the maximum field strength and caused the generator to put out a high charge rate, provided the generator was in good operating condition.

On a good many of the late-model generators, notably on Fords and special heavy-duty equipment on Army cars and trucks, the method of grounding the "F" terminal to the frame of the generator will not work at all, and for a very good reason. On generators of this type, the inside end of the field circuit is grounded to the case of the generator, and to ground it on the outside simply results in killing any chance to get an output.



2. Circuits of a two-brush, or shunt-type, generator, as used on most General Motors and Chrysler cars and trucks. Ground "F" terminal to test for full charge rate.

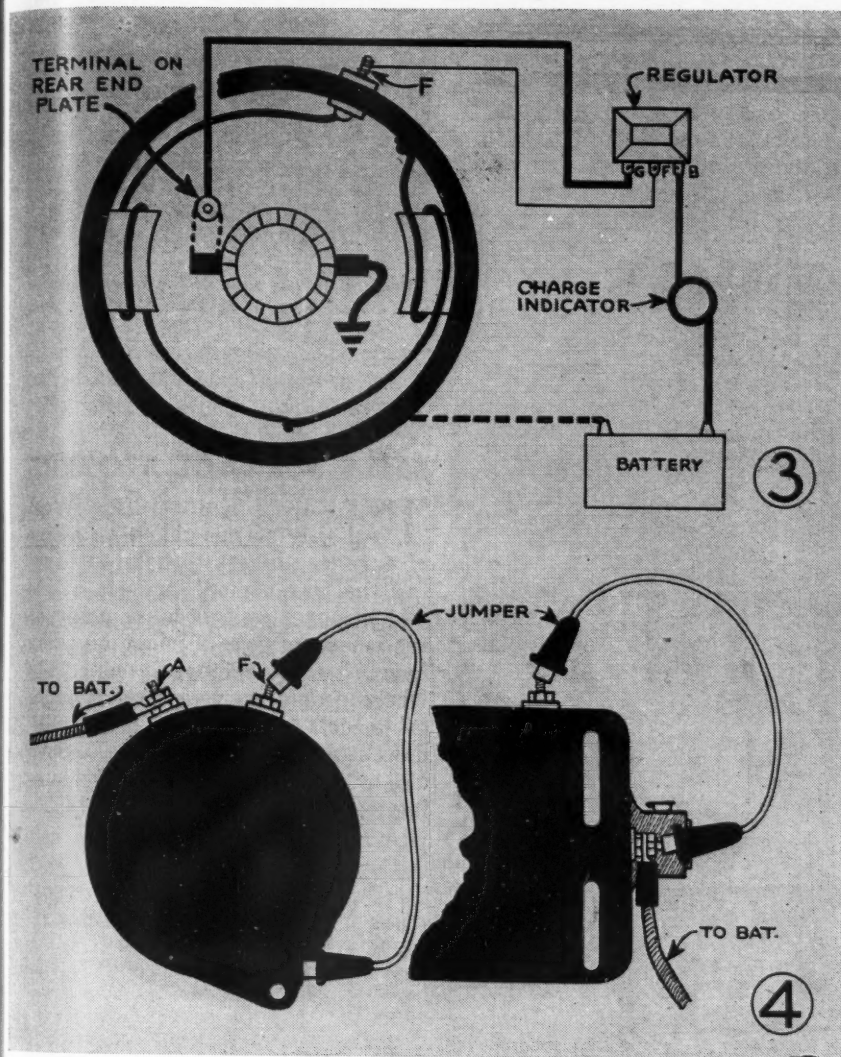
QUICK CHECK

Some timely tips on testing these units that will

On generators with an internally grounded field, it is necessary in making a quick check for output to connect the field (F) terminal to the main, or A terminal, by means of a jumper. This connects the field circuit to the main (out-

put) brush, and allows current to flow through and energize the field coils. Generators of this type are always of the plain-shunt, or two-brush, type.

Figs. 1, 2 and 3 show the complete circuits of the three most



3. Circuits of a two-brush, or shunt-type generator, as used on late-model Ford and Mercury cars and trucks. To test this generator for full output, the "A" and "F" terminals must be connected.

output can be regulated by moving the brush.

Fig. 2 shows the circuits of a conventional two-brush shunt generator as used on many Delco-Remy and Auto-Lite equipped cars and trucks. It is the nature of generators of the shunt type to increase their output as the speed increases. Therefore, all regulation, both voltage and current output, is controlled by a three-unit type of regulator, consisting of a voltage unit, a current unit, and a reverse-current relay. Note that, on this type of generator, the inside end of the field circuit is connected to the insulated, or output, brush. As a general thing, this type of generator can be identified by observing how many leads fasten to the insulated brush holder; one from the "A" terminal and one from the field coils. There should be no lead going to the ground brush.

Fig. 3 indicates the circuits of shunt generators having an internally grounded field. In most cases, the inside end of the field circuit will be solidly grounded to the field frame, but, in a few cases, it may be grounded directly to the grounded brush holder. The only lead connecting to the insulated, or output brush, will be the one going to the output, or "A" terminal of the generator. In the case of generators used on Ford cars and trucks, the main output terminal is located on the rear of the commutator end frame and is directly connected to the insulated brush holder and brush. On these generators, the field terminal is located on top of the field frame.

In the case of the first two types of generators mentioned here, it is only necessary to use a jumper wire to connect the field (or F) terminal to a ground on the generator to see if the generator is capable of charging. In the case of the last type, the jumper must be used to connect field (F) and the main (A) terminal together. Fig. 4 shows exactly how the jumpers

(Continued on page 50)

4. Method of testing full charging capacity of Delco-Remy generator, left, and Ford-Mercury type, right. Use jumper to block out voltage and current regulator.

ON GENERATORS

save you time and prevent waste of vital material

popular types of generators used on the majority of late-model cars and trucks. Fig. 1 shows the typical three-brush generator. It may or may not have an adjustable third brush. If the third brush is adjustable, the generator is to

be used with a voltage regulator of the vibrating, or two-step, type. If the third brush is fixed in position, all regulation must be done by the regulator unit, whereas, with the generators having an adjustable third brush, the top ampere

★

WAR BRINGS NEW OPPORTUNITIES



Instead of becoming panicky about restrictions, these shops employed them as guides to new lines of work



Sales and service shop of the Mertz Knippel Co., West Allis, Wis., showing stoker sign.

SELLS FURNACE STOKERS

THE Mertz Knippel Co., West Allis, Wis., has taken on a line of furnace stokers to help out during the war period. This is a line which moves well, because many of the emergency restrictions on them have been removed, especially where people want to convert from oil to coal. A sign on the Mertz window says, "Help Save Coal. Save money for Defense Bonds by buying a Stoker."



NEW USES FOR OLD ENGINES

THE time is not yet ripe for turning swords into plowshares but H. C. Metz, owner of the Metz Sales & Service Station, Renrock, Ohio, believes he is hastening that day by turning idle motors into power plants. His idea originated with the curtailment of new farm and small-shop machinery and the rising demand for home-built power plants. He placed the following ad in the local newspaper:

IF YOUR CAR is too good for scrap and too common to be stored for the duration, we'd like to buy it.

Body and rubber make no difference in the price. We want the motor.

METZ SALES & SERVICE STATION.

Almost immediately, Metz began to get motors to salvage. Equipping and servicing these engines provides a paying sideline, and besides eliminating dozens of decrepit cars, Metz shares the honor of

helping local industry do a wartime job.

"Among farmers and small-shop owners, the demand for power equipment was never greater," Metz declares. "This is due mainly to restriction governing the sale and delivery of new machinery and also to the labor shortage, which makes mechanical power necessary on various jobs formerly done by hired men. Car engines make an ideal power plant for most of these jobs, and quite naturally, farmers and tradesmen are on the alert for the shop that will help supply their needs.

"In starting this wartime sideline," Metz explains, "we aimed toward cars which had poor rubber and appearance, but fairly good motors, which with a little repairing, can be made into either stationary or portable power plants. We buy these cars direct; mount the motor to suit the buyer's requirements, and supply the service, fuel, and accessories to keep it going. We pay car owners anywhere from \$20 to \$150 for the cars, depending on size and condition of motor. Car bodies usually are generally scrapped. The resale price is determined by the amount of labor and equipment necessary to make the motor into the power plant."—F. R. Cozens.



NEW SERVICE FIELDS

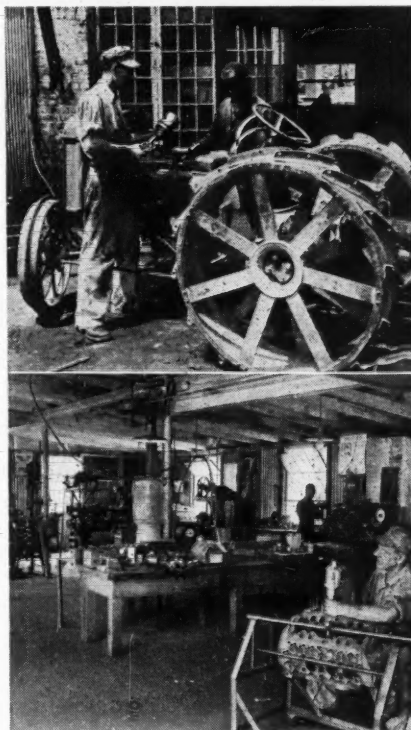
A MACHINE shop which repairs anything in the way of gas or Diesel engines and specializes in the repair of power equipment used by contractors is producing a bigger and bigger share of the income of Bell Automotive & Industrial Supply Co., Birmingham, Ala. Right now the shop is pretty well-gearred to the war effort, as much of its business is in the maintenance of motors being used by contractors engaged in building war projects and by industrial concerns which hold important Army and Navy contracts.

"In the shop we are repairing things we never repaired before and making things we never made before," said Jeff Bell, president of the company.

"As an example, we are doing

considerable cylinder block repairing by a well-known process which enables us to put 75 per cent of the cracked castings back in service."

The company endeavors to carry a full line of motor parts, and many rebuilt motors. It rebuilds motors of all sizes from a motor-cycle block or home-lighting unit to pow-



General view of the Bell machine shop at Birmingham, Ala., where engines of any and every type are repaired. Above, reconditioning a tractor, a frequent service job.

er units for saw mills and big cranes.

While the company has expanded its industrial supply business in recent months, it has also continued to take care of its regular trade with fleet owners, garages and service stations.



ALL-OUT SERVICE

THE Cruse-Crawford Mfg. Co., Birmingham, Ala., Studebaker dealer, is definitely in business for the duration. Service and parts sales for 1942 were many thousand dollars greater than for any year in its history.

The explanation lies in the speed

with which the concern converted to wartime operation. The ink was hardly dry on the freeze order on new car sales before this concern decided to expand its service and parts departments to take up all its salesroom. Since that time, it has been necessary to rent another building to take care of the overflow.



One of the billboards used by the Cruse-Crawford Co. to boost its service volume.

Then the company hired some of its car salesmen as service salesmen, paying them a salary. Floor contacts, the telephone, and direct mail all were used to persuade the owner that he could make his car last longer, save tires, and save gasoline by having the car completely overhauled and having it done "at the one place, at one time, and pay for it as you ride."

This effort alone increased service business an estimated 33 1/3 per cent, being especially reflected in motor overhauls, tune-ups, wheel alignment, and brake service.

When the manpower shortage became acute, Coy T. Rogers, general manager, began hiring girls as shop mechanics, probably being one of the first in the country to do so. Today the company employs a dozen girls on paint and body work, motor tune-ups and relining brakes.

In preaching the gospel of conservation, the company took some of its own medicine by putting in a stricter system of caring for its own tools and power equipment. A special tool room was built in the shop, with a man always in charge. When a mechanic wants a tool, such as an electric drill, he has to leave a ticket for it and is responsible for it until it is returned. That has put an end to the frequent loss and damage to tools that cannot now be easily replaced.

This concern was one of the first to advertise its free service to truck owners in helping them obtain "certificates of war necessity," for the purchase of gasoline, tires, tubes and parts. Hundreds of truck owners were assisted.

WPB Removes Quota Restrictions On Replacement Parts Manufacture

IN a sweeping amendment to Limitation Order L-158, the WPB has lifted the quotas previously set for the manufacturers of automotive replacement parts. The amendment, effective April 1, permits producers to manufacture or purchase parts without reference to previous levels of production. However, to make sure that the parts reach the trade, the amendment provides that future production or purchase of parts must not increase the April 1, 1943, inventory of the producer.

Most manufacturers expect the amendment to result in a marked increase in the quantity of parts produced. The amendment to order L-158 has nothing to say about the material supply, which has been a serious obstacle to production in the past year, but many manufacturers report that the material situation has eased. Such vital materials as copper are still closely restricted, but the Controlled Materials Plan, which becomes operative this month, and belated recognition of the importance of automotive maintenance to the war effort are having their effect on material allocation to parts manufacturers.

Several changes are made by the amendment in the parts covered by Order L-158 and, for the first time, standardization of certain parts is attempted.

So far as passenger-car parts are concerned, the following changes are made in the original list of essential parts:

Dropped—Spring covers, spring clip cover tubes, locking-type gas caps.

Added—Bulk tubing for fuel, oil, brake and door-actuating lines (but not copper tubing unless permitted under L-106), bulk or spool primary wire, spark-plug wire, battery cable and magnet wire, safety glass and channels, hood, door, and rear-deck actuating devices.

To the list of essential truck parts have been added governors, cabs and seats, body mechanical and hydraulic hoists (component parts only), tachometers, and door and door hardware.

The parts standardized by the amendment are:

Pistons—As components of engines, pistons shall be produced only in standard sizes and the following oversizes: .005, .020, .030, .040, .060, and semi-finished.

Piston pins—As components of engines, piston pins shall be produced only in standard sizes and the following oversizes: .020, .030, .040, .060, and in addition for medium and heavy

duty trucks and buses, .080, .100.

Engine bearings—As components of engines, bearings shall be produced only in standard sizes and the following oversizes: .002, .010, .020, .030, and semi-finished. In addition, these sizes may be produced in the following oversizes on outside diameter in those types of connecting-rod bearings that oscillate in the connecting rod: Standard, .005, .010 oversize. Special-length Ford bearings also may be produced.

OPA Places Ceilings on Prices Of Used Trucks, Effective April 26

AFTER months of rumor, the OPA on March 31 announced ceiling prices for used trucks, to become effective April 26. The ceiling, according to OPA, represents sharp reductions in the prices of used commercial vehicles, particularly those of recent make.

Two pricing methods are provided. One is for vehicles "as is," the other for reconditioned vehicles, guaranteed for at least 1000 miles or 30 days.

In the case of "as is" vehicles, the maximum price must not exceed the following percentages of the "when new" price at the factory, plus carload freight from factory to place where vehicle is to be sold:

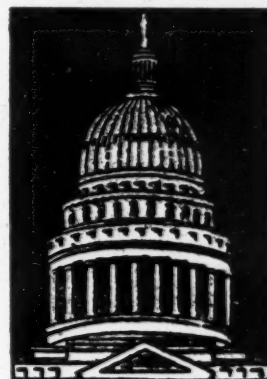
Age of vehicle	Per Cent
Six months or less	90
More than 6 months to 12 months	81
More than 12 months to 18 months	73
More than 18 months to 24 months	66
More than 24 months to 30 months	59
More than 30 months to 36 months	53
More than 36 months to 42 months	48
More than 42 months to 48 months	43
More than 48 months to 54 months	39

More than 54 months to 60 months	35
More than 60 months to 66 months	32
More than 66 months to 72 months	29
More than 72 months	26

For reconditioned and guaranteed trucks, 5 per cent of the price arrived at by use of the above percentages may be added, together with the maximum prices for parts, labor, and material needed and used in the reconditioning. In no case may the price of a reconditioned and guaranteed vehicle exceed the following absolute ceiling:

Age of vehicle	Per Cent
Six months or less	97
More than 6 months to 12 months	91
More than 12 months to 18 months	86
More than 18 months to 24 months	82
More than 24 months to 30 months	78
More than 30 months to 36 months	75
More than 36 months to 42 months	73
More than 42 months to 48 months	71
More than 48 months to 54 months	70

WASHINGTON WHISPERS



More than 54 months to 60 months 69
More than 60 months..... 68

The regulation also permits charges to be made for accessories or special equipment not included in the price of the vehicle when new.

Rations for A Book Cut To 1½ Gal. a Week in East

ANY elation felt by Eastern motorists when the ban on pleasure driving was formally lifted March 22 was quickly quenched by the further announcement that basic A rations in 16 Eastern states, eight counties of West Virginia, and the District of Columbia would be halved as of the same date. The value of A coupons was not changed in the affected areas. Instead, the valid period of No. 5 coupons was extended from two to four months.

Coupled with these announcements was the statement by OPA that drivers who had been using their A rations to drive to work would be granted supplemental rations. Later came an announcement that, to be eligible for additional gasoline, A book holders would have to form car-sharing pools, carrying three or more other persons to work regularly. In no case, it was stated, would the supplemental rations exceed 90 miles a month, the mileage allotted for occupational driving with A books before the present ruling.

War Tires Available To Holders of B Books

MORE liberal tire-rationing rules, announced by the OPA effective April 1, permit a larger group of motorists to obtain Grade II tires and greatly increase the state quotas for April.

Under the new rules, all owners with a mileage ration of more than 240 miles a month—B as well as C book holders—are made eligible for Grade II tires. This grade includes

(Continued on Page 76)

★ RUST INHIBITOR

The use of sulphonated oils as a rust inhibitor for cooling systems has been forbidden by WPB because the stuff is scarce. The reason for the scarcity is the low price ceiling put on it by OPA. The reason for the low price ceiling is that sulphonated oils have been made, up to now, solely as a by-product. Refiners cannot produce it as an end produce at the price ceiling. Double the price would not be prohibitive, and anyone who has had cooling system troubles would consider it a bargain at double the normal cost. Chromates, the other commonly used inhibitor, are out, of course, because of the critical chromium situation. This leaves the common kitchen variety of borax at the only substitute. No one has outlined the shortcomings of borax when used as a rust inhibitor, but the feeling persists that it must not be as good as the others since it is plentiful and cheap, but no one used it until forced to it.

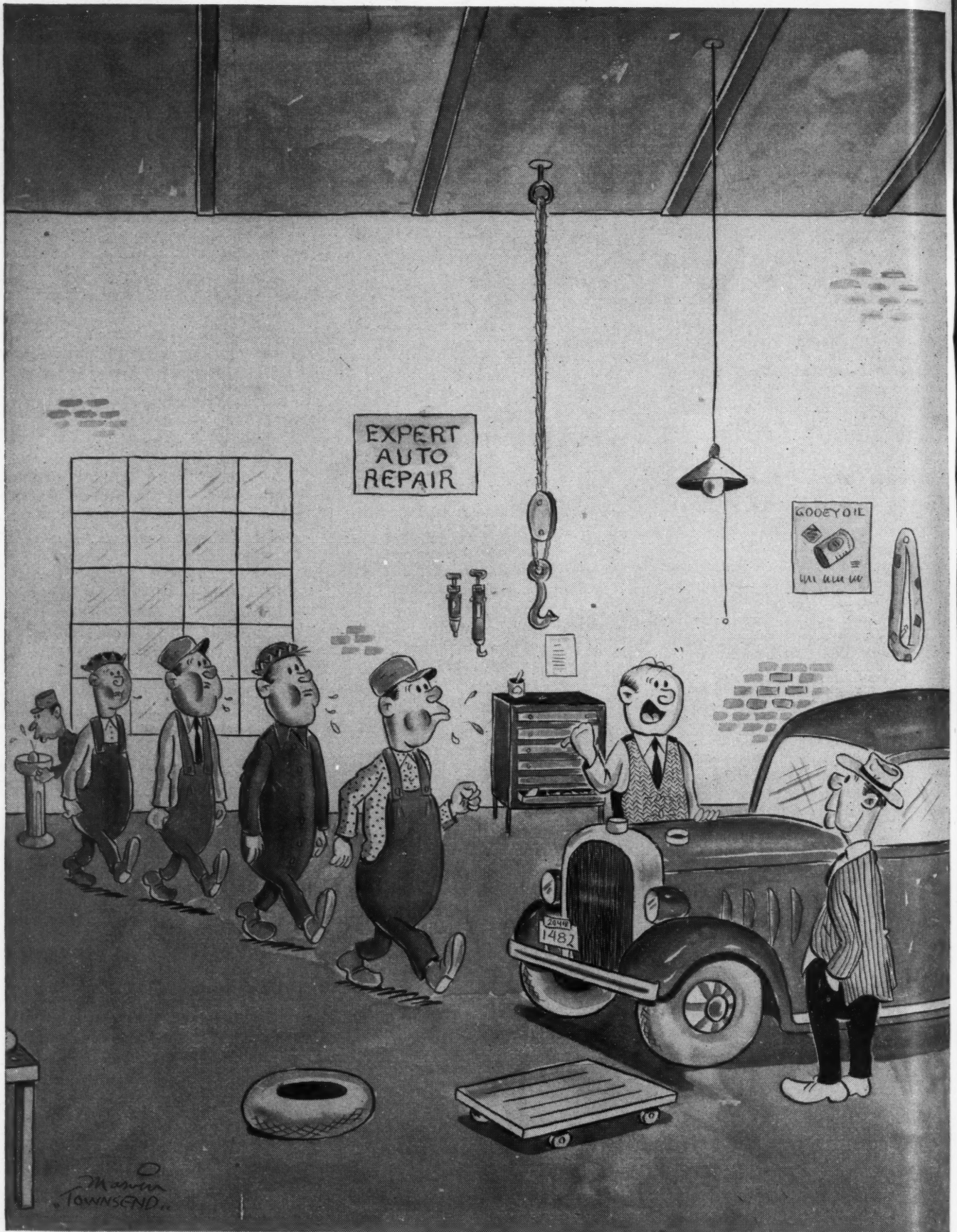
★ RUBBER

Judging from results, synthetic rubber must have a worse supply-to-demand ratio than natural rubber. Rubber water-pump seals made of synthetic rubber have long been entirely satisfactory, but recently the synthetic has been replaced by natural rubber, probably with some reclaimed product. The natural-rubber seals have not been satisfactory and the minute amount of synthetic saved has resulted in a disproportionate amount of wasted manpower in maintenance and interruption of transportation. This may seem like a trifle, but it is important enough to have representation made to Rubber officials to correct the situation.

★ DISTRICT MEN

No matter how the regulatory bureaus were supposed to work, the fact remains that contact with the local automotive specialist of WPB is more valuable than contact with anyone from the local ODT office, if you are having trouble getting parts. ODT takes the position that WPB controls the priority system and any assistance in getting parts must come from WPB. Although, legally, the user of a part does not need priority. Arrangements have been made for WPB local men to

(Continued on Page 86)



"Here are the men to fill your radiator. We turned in our rubber hose to the scrap drive!"

NEW profit makers

PARTS TOOLS EQUIPMENT ACCESSORIES

Plastic Valve Cap

Plastics have found another new application in a new all-plastic tire-valve cap which is said to seat perfectly and hold air up to 400 lb. pressure without need of washers.

According to the manufacturer, this plastic tire-valve cap is molded in one piece, and possesses such strength and ruggedness that it withstands abuse on equal terms with metal caps.



In addition to being self seating, it possesses further advantages, the manufacturer states. These are an unthreaded

"finder skirt" that acts as a guide to simplify application when valves are awkwardly placed; a wide knurled band for firm gripping, and a domed head which provides adequate clearance of the valve-core pin.

This new cap, which retails for 25c per tube of five, is known as the Lacey-Webber "VC-100" and is already available through representative automotive jobbers. It is made by the Lacey-Webber Co., Kalamazoo, Mich.

New Micro-Linor

Toe-In Measuring Gage

A new type of toe-in measuring gage, so designed that it requires only one man to operate it, has recently been placed on the market by Testing Apparatus, Inc., 1627 W. Fort St., Detroit.

The Micro-Linor gage is operated by simply attaching the grippers to the outside of the rims, setting the pointer at zero. Then the vehicle is rolled forward and the rear reading taken. The pointer will show the toe-in in inches.

Once fastened to the rims for the front reading, the grippers hold the gage in place for the rear reading. Consequently, the entire operation can be performed by a single mechanic. The gage can be attached and both readings taken in less than 2 minutes—all without even jacking up the vehicle.

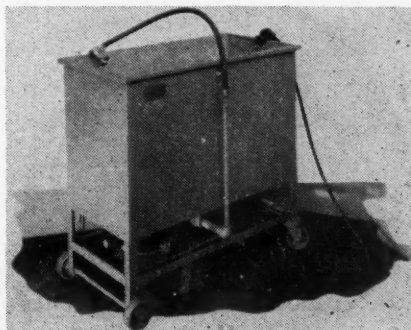
The fact that the gage measures toe-in from the outer tread, combined with the fact that the grippers remain in the same spot for both readings, insures extreme accuracy of measurement.

The gage fits any vehicle—even airplanes. Being only 10 in. long, it is small enough to go in a mechanic's tool kit, a wooden case with a slide cover being furnished for this purpose.

Circo Parts Cleaner

The Circo Products Co. has announced an All-Metal-Parts Cleaner for cleaning metal parts and assemblies of any type. The unit is portable and can be placed wherever cleaning is required. The inside dimensions are 36 in. long by 20 in. deep and 18 in. wide. The overall height including 4 in. casters, is 36 in.

Features of the cleaner include cleaning-liquid volume control at the flusher handle without stopping the motor, immersion-type liquid heater thermostatically controlled, packless-type pump directly connected to electric motor, work rest screen, flusher and hose. Descriptive literature may be obtained from Circo Products Co., 2835 Chester Ave., Cleveland, Ohio.



Gear, Wheel Pullers

Armstrong-Bray & Co., 5364-78 Northwest Highway, Chicago, Ill., announces the addition to its line of Steelgrip Rigid-arm Gear and Wheel Pullers.

The new pullers add to a line that will take care of a wide range of jobs covering factory work, tank, tractor, truck and farm machinery maintenance, etc. The new Steelgrip Rigid-arm Gear and Wheel Pullers are of the same rugged construction as the rest of the line. The forged steel arms, forcing screw, etc., are heat-treated for great strength. They are made in three sizes.

Wartime Fire Extinguisher

A new fire extinguishing unit, made of materials not essential to the war effort, and approved by the Underwriters' Laboratories, Inc., has been developed by the duGas Engineering Corp., Marinette, Wis. All ordinary approved fire extinguishers contain critical materials and only consumers with high priority ratings have heretofore been able to obtain them. The new extinguishing



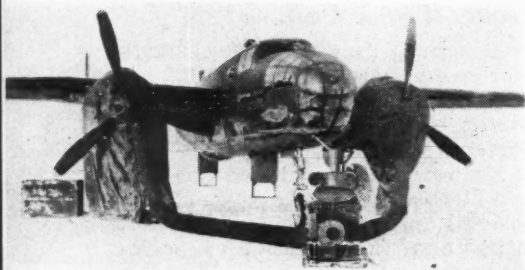
unit is approved under a war emergency specification and is accepted by the ICC for the protection of trucks.

The new fire extinguisher uses the same dry powder that has proved an efficient extinguishing agent when applied from the approved standard metal duGas extinguishers, but, instead of being expelled from the extinguisher under pressure, it is applied manually from a fiber-board tube.

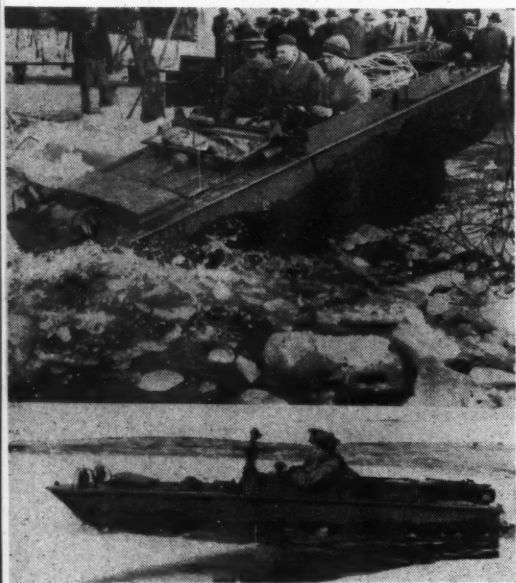


AIR JEEP. The motorized marvel of the new U. S. Army has done many surprising things, and now it takes glider flights. Here Army engineers drive one into big glider

WARM-UP. Motor-driven fans blow hot air through motors of a B-25 bomber on Alaskan field to heat them fast. Fliers know that most wear occurs when engines are cold.



SEA JEEP. Quarter-ton four-wheel-drive car built for Army by Ford can travel with equal ease on land or water. Below, vehicle is shown entering stream and under way.



NEWS

DEALERS PROSPER

AS surprising to dealers themselves, perhaps, as to the dismal forecasters of a year ago is the announcement by the Pontiac Division of General Motors that Pontiac dealers made more gross profit during 1942 than the average for the preceding five years. The 1942 figure was \$6,050,463, the five-year-average \$4,691,584. All figures are before taxes.

It was expected that any money made by the dealer last year would come from his service department, and, although he displayed commendable enterprise in widening his activities, it was service that accounted for the greater share of his 1942 gross. Broken down, his income looked like this:

Service, parts, and accessories	55.5 per cent
New car department..	18.5 per cent
Used car department..	23.6 per cent
Miscellaneous	2.4 per cent
The used-car operations made his-	

FARM SOLDIERS. A jeep, driven by an American soldier, cultivates a garden plot in England to help solve food problem there.

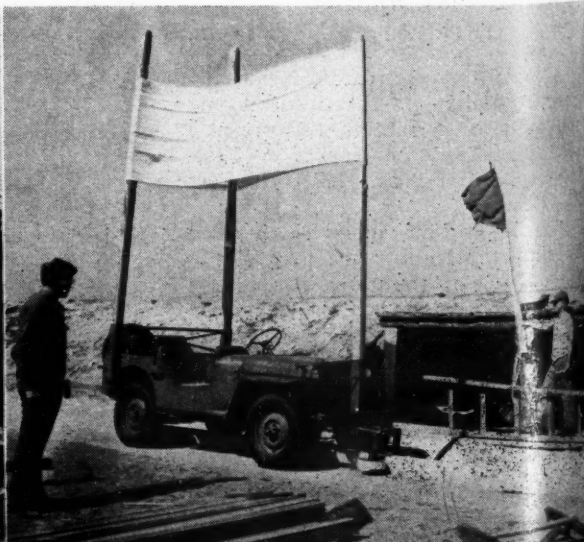
tory, for dealers generally had never before realized a gross profit on this phase of their business. Some of the gross was the result of liquidating stocks but much of it was the result of buying and selling used cars. The explanation, of course, lies in the fact that last year was the dealer's first opportunity to handle the business entirely on his own responsibility. He had to buy his merchandise in a highly competitive market, but bought it on its real value and not as a means of maintaining a new-car quota.

The experience of Pontiac dealers during 1942 leaves little doubt that dealers as a whole have been more than a match for the hardships of war.

REPAIR RATIONS

AN appeal has been made by John L. Rogers, director of the Division of Motor Transport of the ODT, to repair shops to ration their facili-

TARGET TOWER. Army general purpose car, otherwise known as a jeep, serves without a driver to move target for gunners.



DETROIT LETTER

By ED WARNER

DURING 1942 hundreds of men from automobile service shops in the Detroit area left their jobs to work for Uncle Sam, either in the armed forces or in factories producing war materials. The U. S. Employment Service greatly aided this shift of personnel by inducing mechanics to quit the automobile repair trade and take war jobs. The automobile dealers and repair shops are proud to have some of their former employees in the armed forces helping service the jeeps, tanks, trucks and airplanes that are needed to beat the Axis. In fact, one Ordnance Dept. recruiting campaign alone drew 4,600 men from shops in Michigan.

But now the automobile repair situation has become acute, due to the manpower shortage in Detroit, which is the center for more war production than any other city in the U. S. Because approximately 60 per cent of Detroit war workers depend upon private automobile transportation to

reach their jobs in "share-the-ride" plans, it is important that Detroit passenger cars be kept in running order. A recent survey for the Detroit office of the War Manpower Commission showed that the present skilled labor force engaged on automotive service is incapable of handling more than 48 per cent of the privately owned cars in Detroit.

In a nation-wide survey of the automobile-mechanic situation in November, the NADA found that new car dealers in Detroit had experienced a net loss of 42 per cent in their skilled mechanics. This compares with a national average for all automotive shops of 38 per cent, as shown by the Motor AGE survey, published in February.

Starting 1942 with 663 mechanics, the Detroit dealers surveyed were able to hire 205 new men during the year but they lost 484 mechanics, leaving them 384 men to conduct their service work. Of the men quitting

(Continued on page 60)

ties and mechanics' time so that essential repairs are given preference over less essential service.

Admitting that automotive repair facilities of the country are severely overburdened with work, Rogers declares that truck owners are complaining to ODT that it is impossible to have vital adjustments or repairs made because shops are busy with "more profitable" work.

It may be questioned whether it is possible to find work more profitable than truck repairs. If a shop has repaired a so-called non-essential passenger car while a truck was waiting, the reason more likely was that the passenger car was owned by a regular customer, while the truck was owned by an operator who needed a quick job.

Nevertheless, service rationing is being discussed. Its application would place an additional burden on the shop operator, and its enforcement would be tremendously complicated.

(Continued on page 40)

STRETCHING TIRE LIFE. Maintenance program at Camp Lee, Va., has lengthened tire life from 7,000 to 30,000 miles. Soldier at left below inspects casing while the other prepares spot repair.

U. S. TRUCKS IN SOVIET. As if to refute recent charges by Admiral Standley that Russian people are ignorant of extent of U. S. aid comes this photo of Dodge trucks in Mozdok sector.





CHINESE TAXI. Radioman from a U. S. bomber tries local transportation system at Chengtu and finds more fun than comfort.

JUNIOR JEEP. Made by an Oakland, Cal., resident as present for son, this tiny car is used by boy's mother on shopping trips.



GIANT BIKES. Wheels are normal size but riders are members of New York Giants, saving gas at their spring-training base.

MEXICAN MECHANICS. Women of Mexico City, doing their bit for war, learn about repairs from teacher from U. S. plant.



ANTI-FREEZE TESTS

SIMPLE tests for determining whether an anti-freeze solution in the radiator of a car contains harmful ingredients have recently been offered by the U. S. Bureau of Standards at the request of the ODT.

If an owner suspects that his anti-freeze is one of the types recently prohibited by the WPB, the serviceman can set his mind at rest by making one or two easy tests.

For solutions suspected of containing petroleum distillates, draw a small amount of mixture from the radiator and add it to a glass of water. If the radiator solution floats noticeably on the water, the anti-freeze contains kerosene fuel oil, or naphtha.

For salt solutions, drain a cupful of radiator mixture into a clean tin can, and boil until all liquid has evaporated. If a substantial white or crystalline coating remains, the solution contains salt.

The ODT points out that leaving a doubtful solution in the radiator over the summer may cause irreparable damage.

OWNER MANUAL

A COMPLETE manual covering maintenance practice will be made available this month to both truck and passenger-car owners by the ODT. The manual is based on a report by the Society of Automotive Engineers, and outlines the inspections, checks and adjustments necessary to assure efficient operation of all types of motor vehicles.

The manual will be distributed through the field offices of the ODT and of the Office of War Information.

SYNTHETIC LOWER

ONE of the facts to be deduced from the new prices for synthetic rubbers announced by the OPA is that production of these artificial rubbers has already reached the stage where economies are possible. Lower price is an inevitable result of expanding production.

Effective April 1, the price of Buna-S synthetic was set at 36 cents a pound, compared with the previous 50 cents. Butyl is reduced from 35 to 33 cents, and Neoprene is dropped from 65 to 45 cents.

For the sake of comparison, it is worth noting that the price of crude

rubber just before the outbreak of war with Japan was around 21 cents a pound. And it may be worth noting also that, just after World War I, the price of crude rubber reached \$1.25 a pound.

Aside from being our salvation during wartime, synthetic rubber should also insure our being able to obtain tires at a not unreasonable price when hostilities cease.

POST-WAR PACKARDS

IN its 39th annual report, mailed to stockholders late last month, the Packard Motor Car Co. declared that it is definitely committed to return to the manufacture of automobiles after the war, regardless of whether the company continues to make special engines.

It has been generally assumed that all companies engaged in automobile production before Pearl Harbor would return to the automotive field as soon as possible after fighting stopped, and no doubt they will, but Packard is the first to make a formal pledge.

The report points out that the company's position from the standpoint of distribution is unusually good. Franchises for 196 new outlets were signed during 1942. Dealer mortality for the same period was only about 11 per cent and the dealers that quit represented only about 2½ per cent of the company's total car volume under normal conditions. The average Packard dealer showed a profit for 1942.

MANPOWER PLANS

PRELIMINARY soundings are being taken by the ODT to chart a possible course through the rocks and shoals of the automotive manpower problem. Last month, representatives from the ODT's Washington office met with Philadelphia Automobile Trade Association officials to discuss a proposal for establishing mechanic training courses throughout the country. The discussions were merely exploratory, but they did indicate that the seriousness of the manpower situation has at last been impressed upon one of government agencies charged with keeping road transport running.

Some assistance has already been given repair shops in job training through the Training Within Industry program of the WPB, but this has been indirect. Through job analysis and motion study, the TWI has in-

(Continued on page 83)

★ SHOP KINKS ★



Here's your chance to pick up a little cigaret money. We'll pay five bucks (\$5.00) for every Shop Kink accepted and printed. So send 'em in to us—some short cut you use in doing a job easier and quicker than the other fellow—some special tool you made when you couldn't buy one to do the job—and we'll do the rest. Incidentally we won't accept any that have previously appeared in any other automotive publication. Here are some that were accepted this month

SALVAGING VALVES

With the scarcity of parts, and particularly valves, we salvage many valves which formerly would have been thrown away. If when refacing a valve, it is necessary to grind it



down to the point where it shows a feather edge, we then grind the head parallel to the stem just enough to remove the feather edge and prevent the head from burning.—William Avellino, 2142 Lombard St., Philadelphia, Pa.

DIP STICK

We have had several Lincoln-Zephyr cars on which the oil gage float has developed a leak and the gage no longer registers the oil level. To replace the float requires dropping the oil pan, which involves considerable time.

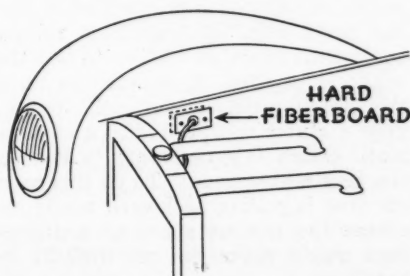
We have made a substitute gage for these cars by pulling the gage wire up and cutting it off. This allows

the float to drop back in the oil pan and settle to the bottom. Then we take a piece of 1/16 in. wire and insert it in place of the original gage wire, bend a loop in the upper end for a handle and we have an efficient oil dip-stick.—Orville Thompson, 512 Maple Ave., Ridgway, Pa.

PREVENTING SHORTS

I have a simple way of fixing shorts and preventing them on Ford cars, where the headlamp wire goes through the metal shield.

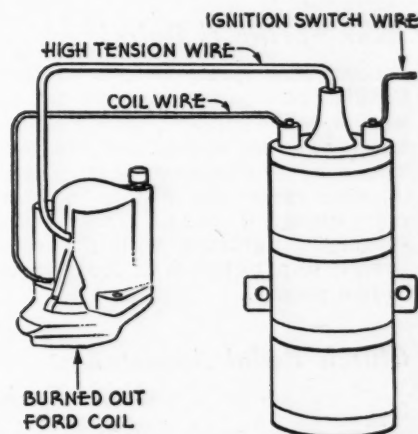
Take two pieces of hard fiberboard about 1/8 in. thick, about 1 3/4 in. wide, and about 4 in. long. Lay them together, drill 1/2 in. hole in center and 3/16 in. hole near the ends. Drill through metal shield to match 3/16 in. holes, then bolt the pieces to the shield, one on outside, one on inside,



centering 1/2 in. hole with 1 in. hole in metal shield. This repairs one side. The wire cannot touch metal, and that worry is over.—Edwin Buffington, Box 453, Ashdown, Ark.

REPLACEMENT COIL

When a coil burns out on a Ford and a new one is not available, it is possible to install another make of coil by drilling a hole in Ford coil case and connecting the high-tension

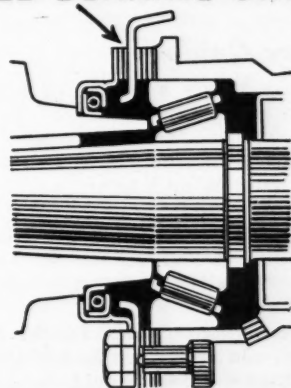


lead through this hole to the rotor contact and then sealing the hole. The low-tension wire is connected under condenser screw. The other coil lead is connected to the ignition switch.—A. H. Haynes, 2218 High St., Portsmouth, Va.

CURE FOR GREASE LEAK

I have recently had several Chrysler cars come into the shop with bad

AXLE BEARING SHIMS



grease leaks at the rear wheels. Upon examination, I find that the hubs are worn so badly where the grease retainer contacts them that new retainers will not stop the leak. To overcome this condition, I place several rear-axle-bearing adjustment shims back of the grease retainer to move it farther up on the hub and in every case the leak has been successfully corrected.—Richard E. Strickland, 1430 Bush St., San Francisco, Cal.



SERVICE HINTS



FROM THE FACTORIES

Rear Spring U Bolts

Loose rear spring U bolts on 1942 Cadillac cars may cause the car to wander. The rubber mountings between the rear spring and the rear axle take a permanent setting and in some cases this results in loose rear spring U bolts. These bolts should be tightened with a torque wrench to a tightness of from 45 to 55 foot pounds.

Clutch Pedal Adjustment

4240 Nash

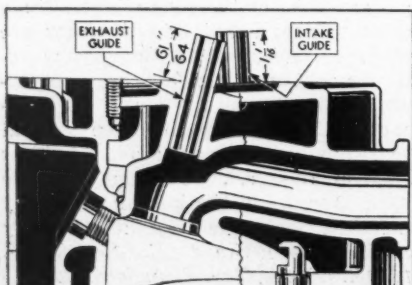
The clutch pedal free movement should be maintained to a minimum not to exceed $\frac{3}{4}$ in. There should be, however, at all times sufficient free movement to prevent the release bearing from running in contact with the clutch-operating levers when the clutch is engaged and the pedal fully released and up against the floor board.

The pedal free movement is adjusted by varying the length of the adjusting link between the inner lever on the idler shaft and the throw-out lever. Lengthening this link reduces the free pedal play and shortening the length increases it.

Valve Guides

Noisy valves and lack of power in many cases can be traced to worn valve guides. The Chevrolet factory has issued instructions that the clearance must be maintained between the valve stem and the guide. The clearance between the intake valve and the guide is .001 to .003 in. and the exhaust valve and guide .002 to .004 in.

Worn valve guides should be replaced. In making the replacement, the intake guide should be pressed into the cylinder head and should ex-

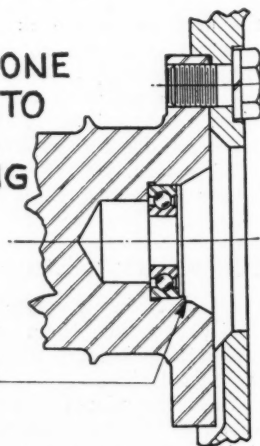


tend above the head $11/16$ in. The exhaust guide should extend $61/64$ in. The guides should then be rough-reamed with a .341 in. reamer and then finished with a .343 in. reamer. Valve guides in the 1941 and 1942 series cars are interchangeable.

Clutch Pilot Bearing

On the 1942 Pontiac car, a shielded bearing is used in the end of the crankshaft as a clutch-shaft pilot bearing. To remove this bearing, it will be necessary to chisel the upset in the end of the crankshaft, which holds the bearing in place when the transmission is removed. When installing the new bearing, make sure that the shielded side of the bearing is toward the transmission and the hole in the crankshaft is clean. If the bearing is not a snug fit, stake the bearing as shown in the illustration to keep it in place when the transmission is being removed.

STAKE ONE
PLACE TO
RETAIN
BEARING

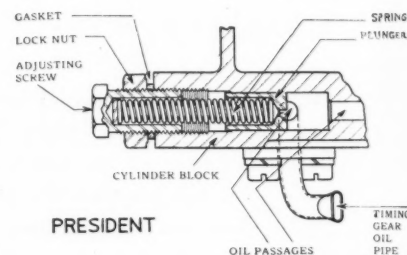


Electromatic Clutch And NO-Rol

The No-Rol sold as an accessory should not be installed on a 1942 Packard car equipped with an electromatic clutch. The purpose of a No-Rol is to keep the car from rolling backwards down an incline. After the brake is applied, it remains so until the clutch pedal is engaged. To engage a clutch equipped with a electromatic clutch, it is necessary to depress the accelerator pedal. To do this on a car that is rolling backward would increase the reverse speed to a degree that would make the car difficult to handle.

Oil Pressure Valve

All 1942 model Studebaker cars are equipped with oil-pressure relief valves, located at the righthand corner of the engine. With the engine operating at higher car speeds and the oil hot, the pressure on the Cham-



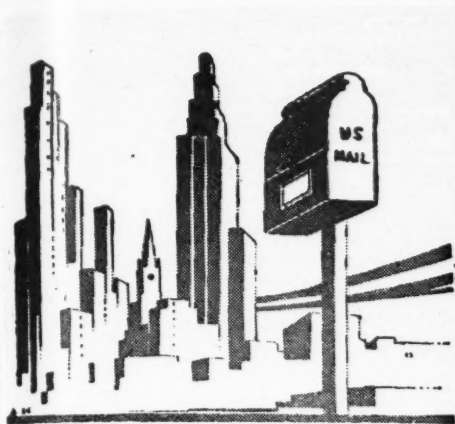
pion and the Commander should be at least 30 to 40 lb. and on the President at least 40 lb. The valve on the President is the only one that is adjustable. To increase the pressure, loosen the lock nut and turn the adjusting screw to the right and, to decrease the pressure, turn the screw to the left.

Crankshaft Pin Size Code

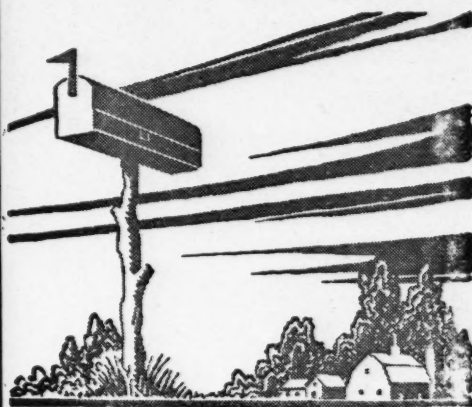
Identification marks on the 1942 Hudson are stamped on the surface of the cylinder block at the left front corner, covered by the oil-pan gasket. These letters, which can be seen without removing the oil pan, designate the size crankshaft pins and journals. PU means that the crankshaft has a .010 in. undersize crank pins. MU means that the crankshaft has .010 in. undersize crankshaft bearing journals. PUM means that the crankshaft has .010 in. undersize crank pins and also a .010 in. undersize crankshaft bearing journals.

Horn Wire Shorted

When the insulation on the horn wire has worn through, it can be repaired without replacing the complete wire. The procedure is to disconnect the wire at the end of steering housing and insert a piece of rubber or fiber tubing over the wire as an insulator. Then tape the lower end of the tubing to prevent its slipping out of place. The length of tubing to be used will be determined by the position of the short in the wire.



Bill Toboldt, Editor, Motor Age



THE READERS'

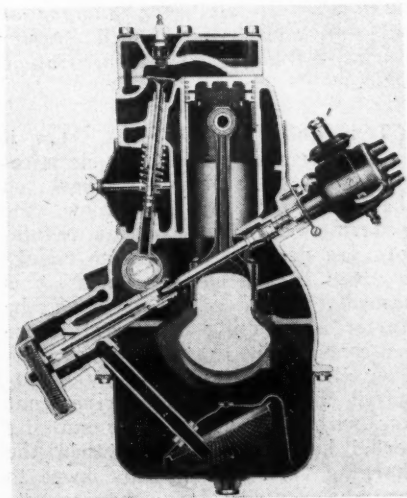
CLEARING HOUSE

of Servicemen's Queries

FUMES AND VARNISH

Due to low-speed driving, crankcase fumes are not being removed, from a car we have in the shop and they are causing quite a lot of trouble. If I attached a flexible line from the outlet breather to the tail pipe do you think this would help draw out the fumes?

We had a ring job on a 1940 Oldsmobile six. When we pulled this job down, it was full of gum and varnish. The varnish was so bad in the crankcase that we had to scrape it with the carbon scraper to get it out. After cleaning the motor as clean as possible, we installed new rings, pins, expanders, connecting rods, and main bearings, timing chain, valve rings, and vacuum pump. This car has about 3000 miles on it since then, and we had a leak on the rear main bearing. Installed another new bearing, and checked bearings with the leak detector and also with shim stock. When we pulled it down for this job, we found the crankcase quite dirty and varnish starting to build right up again. The car is using about a



quart of oil to 300 miles. We haven't pulled it down yet to check this trouble, but would first like to know how to keep this varnish out.—H. H. Chittenden, Adams, Mass.

ONE method of overcoming the difficulty from fumes which you are experiencing with your Oldsmobile

would be to attach a piece of flexible tubing to the breather and carry the other end of the tubing well under the end of the car so that the flow of air will carry the fumes away and not permit them to get into the car. It would not be advisable to attach this flexible line into the tail pipe.

However, I want to point out that quite possibly there is a connection between oil fumes that you are experiencing and the poor oil consumption and varnish. This varnish condition is aggravated by the extreme blow-by past the rings, which also accounts for the fumes. I would, therefore, suggest that you eliminate the blow-by and you will overcome your fumes and certainly reduce, to a great extent, the varnish condition. To overcome the blow-by, it will be necessary to install new rings and, in this connection, I want to point out that some rings will give you more blow-by than others, and it is quite possible to install a different make of rings from the ones you have put in previously.

Of course, if the cylinder is badly worn, it would be advisable to recon-

by mounting the dial gage on the edge of the flywheel housing with the dial gage contacting the flywheel.

Also make sure that the detent springs on the transmission shifter rods are of sufficient tension to keep the balls in place while the transmission is in gear.

If this does not overcome your trouble, you will find the difficulty in the transmission itself, possibly worn gears or defective bearings.

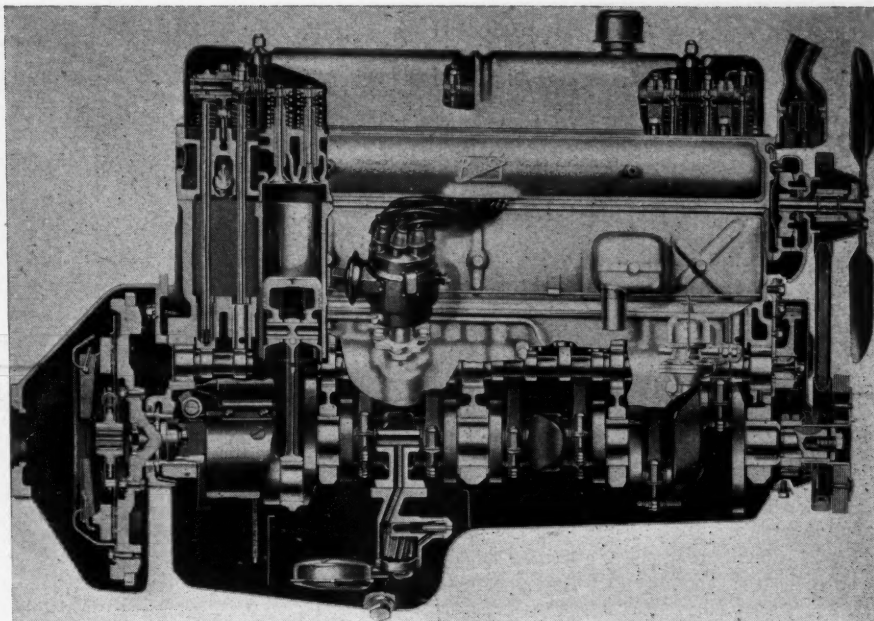
PINS SEIZE

I have a 1937 Buick, Series 40, in the shop which has been driven 43,000 miles. This car has been acting as though the engine were seizing up but, when the car is pushed in gear, the engine starts immediately. After the engine is started, it runs all right for a few days. Generally in the morning the engine seems to be seized tight. Finally the engine seized and could not be started. I tore the engine down and found the wrist pins frozen tight in the pistons. All other parts of the engine were perfectly free. I'm at a loss to know the cause of this trouble, and I surely would appreciate it if you could offer a solution to this problem. A good grade of oil has been used in the car at all times and has kept at the proper level. The engine has never shown any signs of overheating.—Fred Barretta, Tappan, N. Y.

THAT certainly is a peculiar problem you have on that 1937 Buick. Frankly, I have never heard of a similar case where the wrist pins were seized and prevented the engine from turning over.

However, the only thing I can see is that there is some defect somewhere in the lubrication which might have been caused by anti-freeze leaking into the oil or the use of too heavy oil for winter driving.

I would strongly recommend that, before driving this car, you thoroughly flush out the entire crankcase and



also clean out all the oil lines and passageways so as to be absolutely sure that everything is clean. I would also recommend using SAE 10 oil during the cold weather. Furthermore, if this car is used for just short trips where the engine doesn't really get up to operating temperature, I would advise draining the oil frequently, so as to reduce the effects of a crankcase dilution.

HARD STARTER

I am having trouble with a 1934 Dodge sedan. Two years ago, the motor was overhauled, new rings, pistons, valves and bearings done.

My trouble is that the car won't start most of the time. It doesn't seem to make any difference whether the motor is hot or cold. A funny thing about it is that, whenever we push the car, it starts immediately.

We have checked the wiring, installed new plugs, new points, new coil, removed the switch and installed

a temporary one. Thought it might be the ammeter, so disconnected it. Carburetor O. K., fuel pump and choke works all right, and battery's fully charged.

Anything you can suggest will be appreciated.—Harry W. Weston, Hempstead, N. Y.

IN reference to the trouble you are having with your 1934 Dodge, I would suggest that you check the distributor shaft for wear of the bushings and shaft. If the shaft is worn excessively, the points will not open at cranking speed and consequently the car will not start. I would also have the starting motor thoroughly checked, as it is possible that the unit may be defective and draws more current than it should, thereby starving the ignition system. Almost important of all, check the battery ground and also make sure that the engine is grounded to the frame.

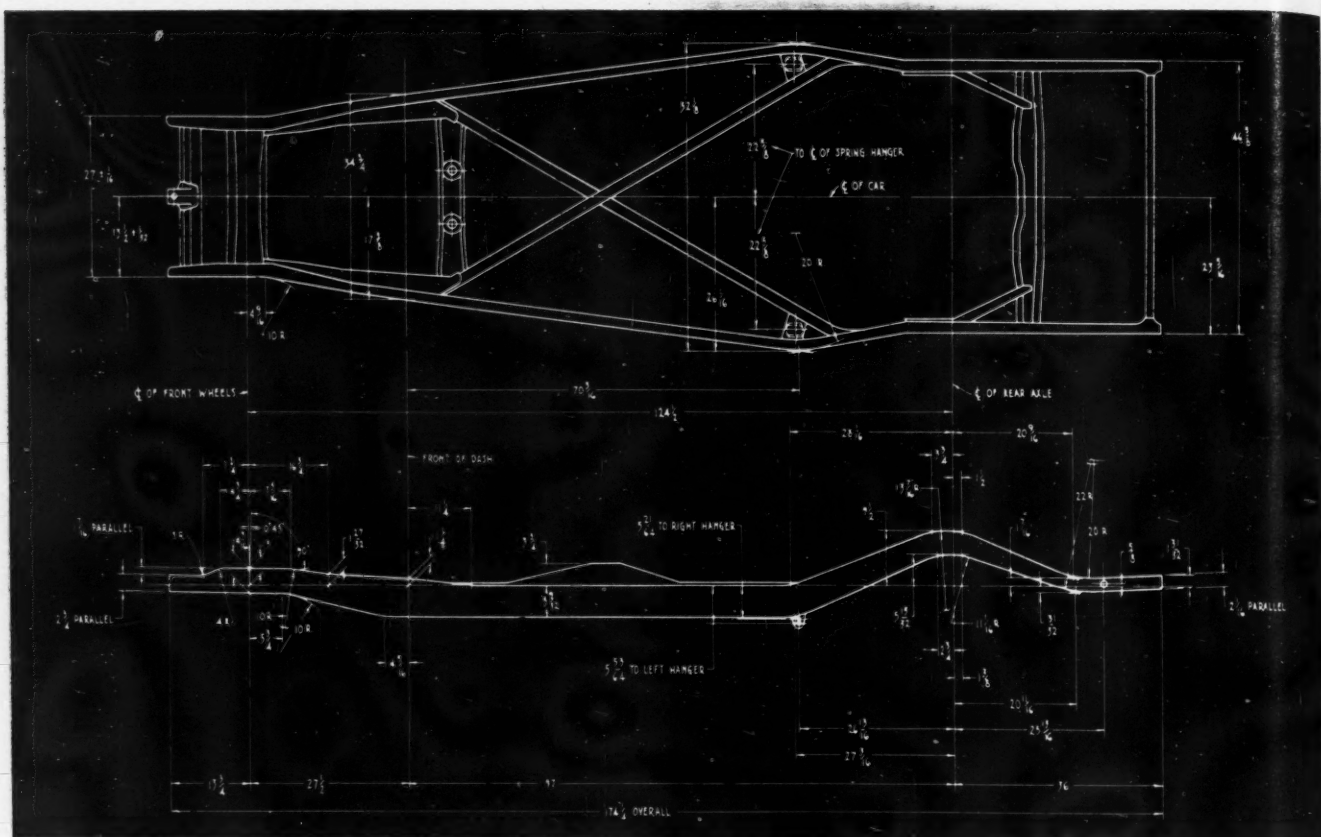
VAPOR LOCK

We have had some trouble with a 1934 F-34 Oldsmobile vapor locking. As soon as the temperature gets to 180 degrees on the heat gage when the car is in motion, or when you drive up to the curb, the temperature rises on the gage. Car will start then, but when you get just away from the curb, it stops. We have added more gaskets on the fuel-pump mounting, and raised the carburetor by installing more gaskets. We also have tried different kind of shields between fuel pump and motor without any satisfaction.—Lee Wall, Superior, Neb.

IT occurs to me that quite possibly your trouble on the 1934 Oldsmobile is caused by the engine running at too hot a temperature. In general, this car has not been troubled with vapor lock, and I think



"Tiny garments, Hell! I'm knitting tire liners!"



Frame Diagram, 1942 Studebaker President

that the best plan would be thoroughly to flush out both the radiator and water jacket with some special compound, which would eliminate any rust and scale that has accumulated. This is particularly necessary if the car still has the original radiator, for, after nine years of driving, the interior of the radiator has become so clogged with rust and scale that the flow of water is obstructed and consequently the temperature of the engine is higher than it should be. You might also try a different brand of gasoline, as some fuels are more prone to vapor lock than others.

VALVE BURNER

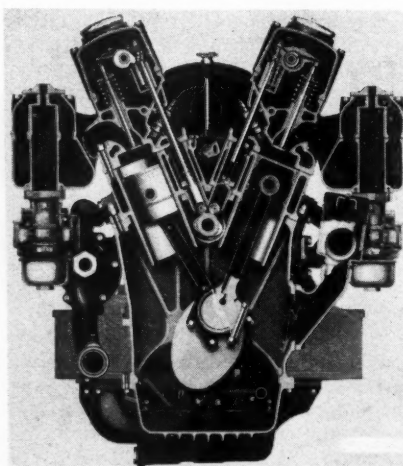
We have the repairs on a 1935 12-cylinder Cadillac, which is burning valves so badly that it is necessary to replace them twice a year. I am at a loss to know what is the trouble.

Will you kindly give me all the information you can, including diagram of oil system, as well as some simple way that I can check valve-spring pressure at valve opening, as it is my belief that there is too much oil pressure on valve lifters or the springs are weak.—S. P. Bennett, Lake Placid, N. Y.

THE relation between valve-spring pressure and valve travel on V-12 Cadillac engines is such that each .010 inch of travel is equivalent to 2.73 pounds of pressure. In conse-

quence, the seating pressure of the valves may be reduced considerably by the slight increase in travel occasioned by a valve refacing and reseating operation. Reduced valve seating pressures would, moreover, effect engine performance to a noticeable degree, especially in making cold-weather starting more difficult, and in some cases would actually cause the valves to burn. To control the valve seating pressure, it should accordingly be checked after a valve reseating operation. Cadillac Motor Car Co. furnished a tool, part No. J444 for making this test.

The correct seating pressure for the valves with both valve springs



properly installed should be from 48 to 63 lb. If the pressure is less than 48 lb., one or more spacers should be installed under the valve spring retainers. A spacer .040 in. thick is available from Cadillac for this purpose under part No. 889407. Each spacer will raise the seating pressure 10.9 lb. Each valve should be tested separately and one or more spacers installed as required. In cases of extremely low seating pressure the valve springs should be checked against the following specifications:

Free length	
Inner	1.944 in.
Outer	2.215 in.-2.235 in.
Pressure	
Inner Compressed to	
1.751 in.	18-21 lb.
Inner Compressed to	
1.407 in.	49-54 lb.
Outer Compressed to	
1.922 in.	48-52 lb.
Outer Compressed to	
1.578 in.	111-120 lb.

SLOW PICK-UP

I have a 1937, '40 Buick. It starts fine, cold or hot. On pick-up hot or cold, it will not take the gas as you feed it. Seems as though it makes several revolutions of the motor before it takes hold and then it wants to back fire through the carburetor. At 18 or 20 miles on a corner, it seems as though it has no power or that

mixture is too lean, but it works fine at 35 up to 62, and then it seems as though it is all out of time. Drop it back to 15 miles and, on a pick-up, I have to wait on it and it won't pick up until it seems to backfire and get a good charge of gas. This is what has been done: New rings, pins, expanders, valve springs, plugs, and valves refaced and seated, .002 in clearance on valve guide, all new jets in carburetor, new points and condenser, rotor and cap and steel re-liner for ball race on spark advance and new vacuum control. Heat-riser tubes are in good shape. Have tried another coil. Points are set at .015, valves .015 hot and plugs at .025.—E. M. Risher, Spencerville, Ohio.

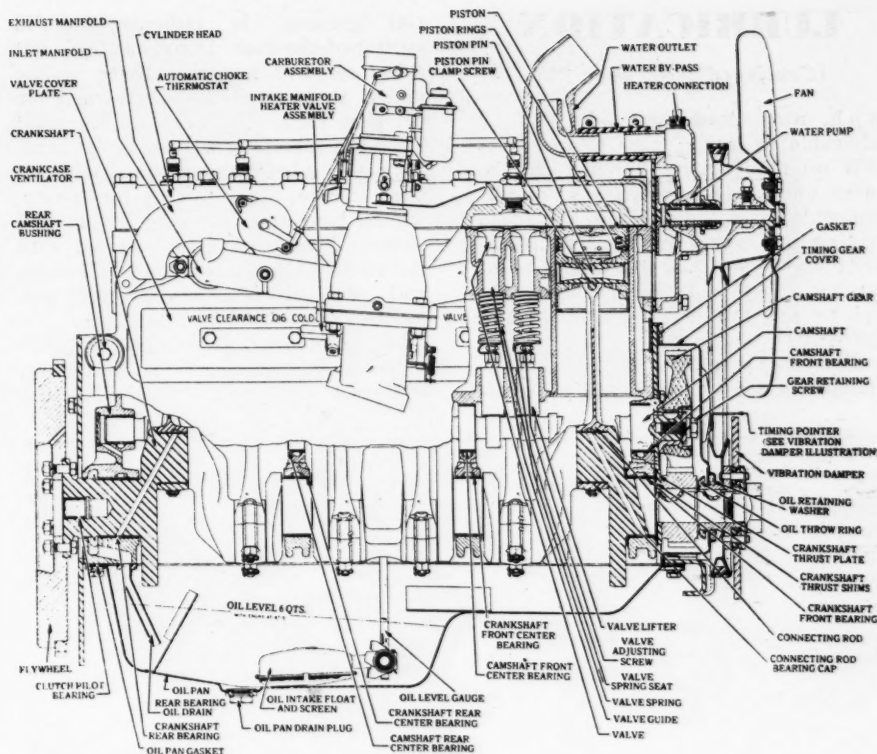
FROM the description you have given of the trouble you are experiencing with a '37 Buick, I think the trouble is possibly in your carburetor, and, in that connection, the first place I would look would be the accelerating-pump jet, as it sounds to me as though it were loose. I would recommend that you check over this carburetor once more or possibly install a rebuilt unit. In addition, there is also a possibility that there is a hole burned through the exhaust and intake manifolds, with the result that the fuel mixture will be constantly diluted by exhaust gases.

TRACTOR VALVES

What is the valve clearance on a WC Allis Chalmers farm tractor? Also, how tight should I draw the head bolts with a tension wrench and what is the magneto-point setting on this tractor? — Wesley Niswender, North Canton, Ohio.

THE correct tappet clearance on your model WC Allis Chalmers tractor is .010 in. for both intake and exhaust valves. This tappet clearance should be set with the engine hot. Breaker-point gap on this tractor is .015 in., and the breaker point should open 30 degrees before top center.

In reference to the cylinder-head-bolt tension, we do not have any exact data on this, but I am quite sure that, if you will use about 65 foot-pound pressure, it will cause no distortion and you will have no difficulty from blown gaskets.



OIL PRESSURE FALLS

We have a 1936 Studebaker Dictator, in which we cannot keep rod bearings. We reground the crankshaft and installed undersize bearings, tested with oil pressure, and oil comes through to each rod O.K. Oil pressure will hold at 30 lb. at 30 m.p.h. for first 500 miles and then gradually drop, and soon afterward a rod knock appears and a little later goes out completely. Can you suggest a remedy?—Boyd's Service, Galeton, Col.

AFTER carefully studying the difficulty you are experiencing with a 1936 Dictator, it would seem to me that the trouble is caused either by driving this car too fast, probably in low gear, or you have slipped up somewhere in replacing the bearings. I would, therefore, suggest that you carefully check with the owner to make sure that he has been driving the car at a reasonable speed and not going downhill wide open.

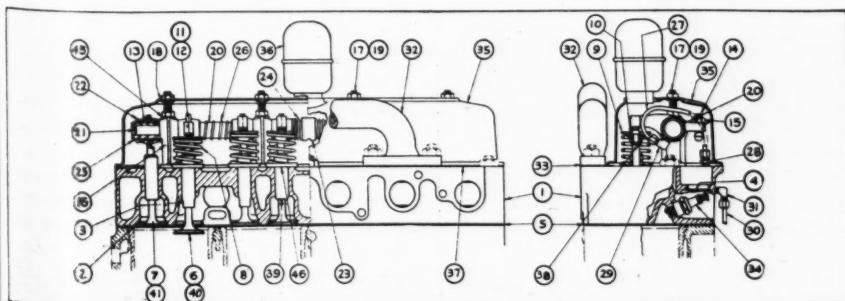
If the car has been driven in a normal manner, I would suggest that you make a careful check to make

sure that there has been no leakage of anti-freeze into the crankcase, which might cause your trouble, and also recheck the oil pressure test. In making this test, you should get oil at each bearing and the oil should be at the rate of about 30 or 40 drops per minute while the engine is being cranked. In no case should you get a steady stream of oil from any bearings but you should get some oil. If any of the bearings do not show any oil, it is generally safe to assume that the oil lines or passageways are clogged in some manner. However, I am inclined to think that you will find trouble in the way the car is driven.

RADIATOR CLOGS

Please tell me how to move fins on a radiator 3/16 in. apart to 5/16 in. (center to center) apart on a tubular radiator. One radiator has three rows of round tubes. Another has two rows of flat tubes. I want to move the fins so wheat chaff can go through. These radiators are used on wheat combines, and are large enough to have a few fins removed and still have enough radiating capacity.—E. W. Symms, Cherokee, Okla.

SORRY I don't know of any satisfactory way of removing the fins from radiators without completely dismantling the radiator. I think the best plan to prevent chaff from clogging the air passages is to erect a shield of some sort in front of the radiator to act as a guard, or filter. I would suggest that you try to manufacture one of some fly screening.



LUBRICATION

(Continued from page 20)

m.p.h. war speed limit has made it advisable in many cases to use SAE 10W oil for summer driving. Studebaker and Cadillac already have recommended this light oil for low-speed driving. Consumption may be somewhat higher but the safeguarding of moving parts will be more certain and, in addition, better gasoline mileage will be obtained.

Changing crankcase oil, along with changes of transmission and differen-

tial greases, is indispensable in spring-of-the-year lubrication, but these services are only three of the many that must be performed on wartime cars. Universal joints must have the lubricant renewed, the chassis needs lubricating after a winter's hard usage, and the water pump, wheel bearings, steering gear and electrical units must be serviced with the right grade and type of lubricant, and most oil filters need new elements.

In changing transmission and differential lubricants, it is necessary, of course, to drain the units after the

car has been driven enough to warm them up and then to flush them. Both units should be filled only to the plug level, or even $\frac{1}{4}$ to $\frac{1}{2}$ in. lower if the car is to be driven in high temperatures.

Because of the war, the composition of various lubricants may differ from what it has been, so the smart lubrication man will keep a close check on the service bulletins furnished by his supplier to see that a lubricant at a given time is the same one specified by the car manufacturer.

Lubrication of electrical units must be thoroughly done but not overdone, especially on the generator, starter and distributor shaft. Grease must not be used in such abundance that it has a chance to reach the commutator, bushings or distributor head.

To do a really good job for the customer, the lubrication man ought to check the crankcase ventilating system thoroughly. Defects in the system often build up pressure, thus forcing oil through the rear main bearing. Such a leak can waste considerable quantities of oil.

Related services should be easier than ever to sell the customer. The lubrication man is in an enviable position to check such parts as drag link, tie rod, springs and muffler, and to recommend the servicing or replacement of worn or damaged units.

Because the war has made the conservation of existing automobiles highly essential, spring change-over is more valuable than in any preceding year of automobile history. But the important thing for the serviceman is the fact that full realization of the truth has been driven home to owners. All the serviceman has to do is to offer it.

Buchanan Promoted

Walter I. Buchanan, for the past seven years field representative for the Monmouth Products Co., has been promoted to the position of chief service manager for the company and hereafter will be at the company's main office, 1931 E. 61st St., Cleveland, Ohio.

Buchanan's former work for Monmouth has consisted largely of service to the National Automotive Parts Association warehouses and jobbers. This work has brought him in contact with the principal distributors of automotive parts throughout the United States.

In his new capacity, he will devote a great deal of time correlating production and distribution of Monmouth bearings, clutch plates, king-bolt sets and special products, for which the company has several large contracts with various government departments. He is a graduate of the University of Illinois and a member of the Cleveland section of the Society of Automotive Engineers.



For speed, maneuverability—for fighting power—American planes depend not on wind but on air—*controlled* air under the propeller's pressure. Controlled air under pressure is what has made the name *Kellogg-American* famous in automotive service and industry. Air where you want it, when you want it, as much as you want, dependably and at low cost.



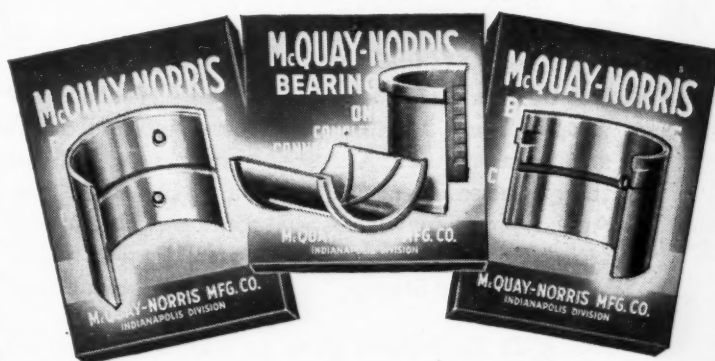
Kellogg-American

AMERICAN BEAKS SHOE AND FOUNDRY CO.
KELLOGG DIVISION, ROCHESTER, N. Y.
AIR COMPRESSORS • CAR WASHERS
CAR LIFTS • PAINT SPRAYING EQUIPMENT

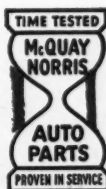


Busy Shops Call the McQuay-Norris Jobber First

He's the mainstay of you repairmen and car dealers in your big wartime job of keeping America's cars, trucks and tractors rolling. Call him for Altinized Engineered Set Piston Rings and anything else from the McQuay-Norris complete parts line*—complete from piston rings to wheel suspension parts. Remember, McQuay-Norris Engineering Service eliminates guesswork...saves you time...avoids come-backs...makes you money. Your McQuay-Norris jobber is the man to call or see—*first*.



McQUAY - NORRIS



*PISTON RINGS • PISTONS • PINS • VALVES
BOLTS • BUSHINGS • SILENT-U SHACKLES

BEARINGS • SLEEVES • PUMP PARTS
WHEEL SUSPENSION PARTS

GENERATORS

(Continued from page 31)

are placed for each type of generator.

It is not necessary, provided the relay unit in the regulator is functioning, to disconnect the regular cables from the generator to make the tests mentioned. However, if the generator still shows no charge, it might be well to use an additional jumper temporarily to by-pass the relay unit of the regulator. This additional jumper would be connected momentarily across the regulator

terminals marked "BAT" and "GEN". If the generator now charges, the relay coil and points in the regulator are at fault.

There was a time not so long ago when it was the usual practice to throw away a balky regulator and install a new one. This was perhaps a good idea because comparatively few service men either did not know properly to service a regulator—in spite of all that has been written on the subject—or did not have the necessary equipment to make a first-class job of it. Today the picture is different. In some localities, at least, it is next to impossible to obtain a new



"REMEMBER ME?"

"Sure, you remember! I'm the kid that used to work down at the corner garage . . . they used to call me 'Grease Monkey.' Well, I'm still at it, see, only this time for Uncle Sam. Now, instead of sedans and jalopies, I work on jeeps, and peeps, and half-tracks and prime-movers. A little different, sure, but one thing's the same . . . I'm still usin' K-D Valve Tools. An' boy, out here where speed counts, *that's some-thing*. Gotta gettem rollin', but fast. Keep on buyin' War Bonds and Stamps . . . we'll do our job out here.

K-D Tools have gone to war. We're proud of that. But we have a job to do here at home, too. We are supplying Jobbers just as fast as we can to fill the needs for repairing and servicing essential civilian cars and trucks. K-D Mfg. Co., Lancaster, Pa. and Hamilton, Ontario.

K-D TOOLS
The Hustlers for Your Toolbox!



"Gosh a dollar tip! What sort of oil did you give the guy?"

regulator, and it is a case of fix up the old one or do without.

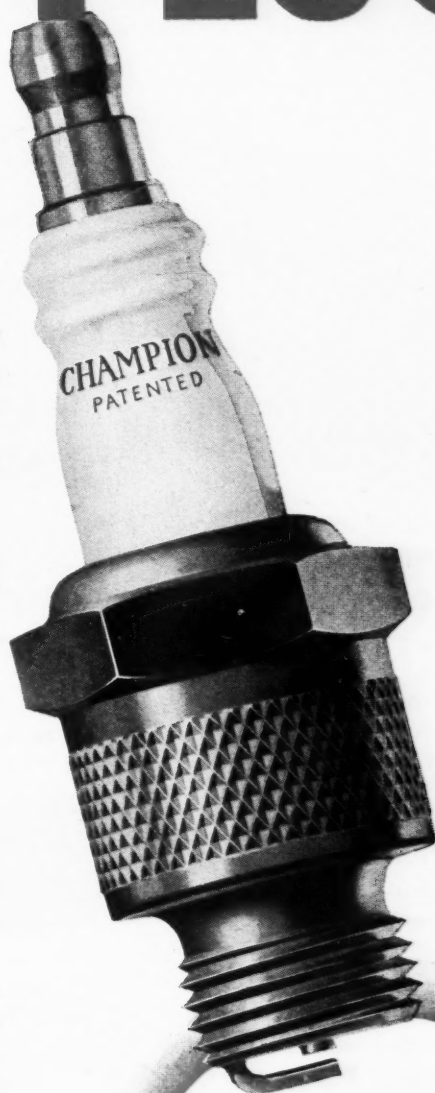
For some years back, I saved up all the old regulators instead of throwing them in the junk. Now this pile of old regulators—not much in weight of old metal—is helping dozens of cars and trucks to stay on the road. Hardly a day passes that a spring, a contact point, or a whole voltage, current or relay unit is not taken out of one of these old regulators and used to repair another one.

We have to do a lot of things these days to give service that were not even considered before Pearl Harbor. A week or so ago an Army contractor brought around a special truck with a V-8 motor. The generator armature was burned up and so was the cause of it all—the regulator. Putting the generator back into shape was easy because we had the armature in stock. The regulator, however, was a different story; there wasn't one in town and the local dealer said they had been on order with the factory branch for the last six weeks. Yet the contractor had to have the truck on the job—but mighty quick. We spent about two minutes dopping out just what changes were required in order to use a different make of regulator we had in stock.

Changing the generator from a "live" field terminal to one having a "grounding" type was simple. We removed the field terminal end of the field coils from the terminal post and connected it directly to the output terminal post on the rear end plate. The other end of the field circuit was removed from "ground" and carried over to "F" terminal. The generator was not of the type that would work with the usual three-unit type of Delco-Remy or Auto-Lite regulator. When tested out with one of these regulators, the generator worked per-

(Continued on page 52)

CHAMPION SPARK PLUGS



Champion dealers everywhere report unprecedented interest on the part of motorists in proper servicing and maintenance of their spark plugs. This is understandable since gas rationing and rubber conservation have become the personal and patriotic responsibility of every one of us.

The thing to remember is that never before has the motoring public been so conscious of the vital part spark plugs play in determining engine performance and economy.

Conscientious and careful inspection, testing and cleaning of all spark plugs regardless of make will produce results in better engine performance and economy a hundred times more convincing to the customer than any sales talk.



You have a priceless opportunity to drive home, *for all time*, the importance of having the right spark plugs in the right condition, at all times.

Now as never before the Champion Tester and the Champion Service Unit are your best spark plug salesmen. Keep yours in good condition, and suggest spark plug service to every customer at regular intervals. You'll find him receptive and cooperative—particularly while having his tires checked. Champion advertising, constantly reminds your customers of the recognized superiority of Champion Spark Plugs and of the fact that they may look to you for intelligent conscientious service.



**To Save Gasoline
keep
Spark Plugs Clean**

GENERATORS

(Continued from page 50)

fectly and the job went out of the shop on schedule.

There are two other important things that must be regularly inspected if the idea is to try to prevent generator failures—brushes and bearings. Worn-out brushes probably cause as much generator trouble as any other thing. This is especially true on the older three-brush generators, where, if the insulated main brush wears out first, you are almost

certain to have a set of burned-out field coils to replace as well as an armature.

If either the grounded main brush or the third brush wears out first, some one is lucky, for in this case the generator will stop charging and no particular harm is likely to result. In the case of the straight shunt, or two-brush generator, both brushes are essential in making the generator charge, and if either one ceases to bear on the commutator the machine will build up no voltage. However, in both types of generators, a brush that wears short, sticks, or has weak

spring tension will cause arcing on the commutator, and may, or often does, create sufficient heat to ruin the armature. Hence, it is very important to make a quick check of brush condition on all generators that come into the shop.

Bearings are the other thing that should never be overlooked. Since nearly all generators employ a ball bearing at the drive end, the symptoms of trouble here are easy to locate. Even the motorist can usually tell when a ball bearing goes wrong by the noise it makes. The bushing at the commutator end, however, gives very little warning, and that warning generally comes after the armature is grounded and the generator stops charging. Check commutator and bearings by trying to pry—gently so—as not to dent the commutator—the armature from side to side and up and down. If there is perceptible movement there is something wrong.

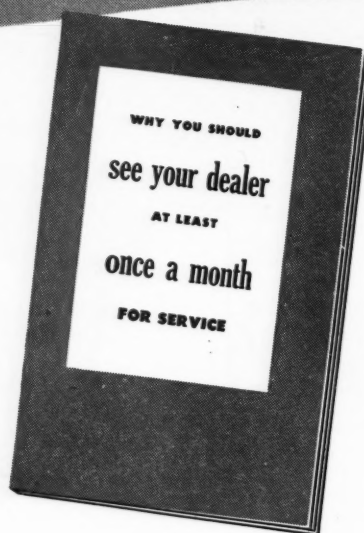
**Would you patronize yourself
once a month?**

**Get This Whole Bookful Of
Reasons Why Customers Should
Bring Their Cars In Regularly!**

It's tough to get people to have their cars serviced every few hundred miles, but mighty important that they do.

So Pennzoil has prepared a book of "reasons why" that you can either give to customers, or mail to them

It's just one item in a whole program built to help keep cars on the road, and you in business. You'll say it's the most valuable help ever offered. And it's yours without cost or obligation!



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FREE
SAMPLE
COPY!**

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Oil City, Pa.

Please send me without cost or obligation a copy of your booklet "Why You Should See Your Dealer At Least Once A Month."

Name _____

Firm Name _____

Street _____

City _____ State _____

604

W. L. Batt Honored

William Loren Batt, vice chairman of the War Production Board and president of SKF Industries, Inc., Philadelphia, manufacturers of ball and roller bearings, has been awarded the Bok Award—a medal and a \$10,000 check—not only for his service to the nation in leading industrial mobilization of the war, but as a citizen who performed the most distinguished service for Philadelphia in 1942. This award is the twenty-first since its inception by the late Edward W. Bok in 1921.

Since being graduated from Purdue University in 1907, Batt has been the recipient of many outstanding honors. Purdue awarded him the degree of Doctor of Engineering in 1933, and this year The Stevens Institute of Technology conferred upon him an honorary degree of Doctor of Engineering, The Drexel Institute of Technology awarded him the honorary degree of Doctor of Science, and the University of Pennsylvania conferred the honorary degree of Doctor of Science.

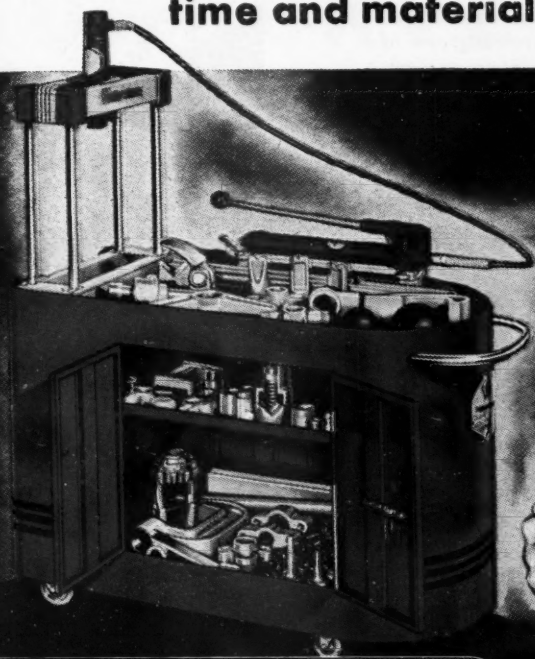
Named Sales Chief

Robert G. Patterson has been appointed general sales manager of The Lamson & Sessions Co., which has headquarters and plants in Cleveland and plants in Chicago and Birmingham.

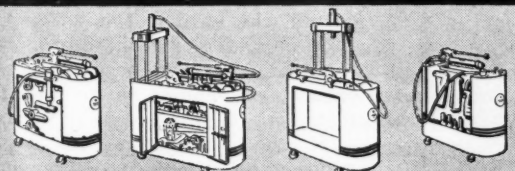
Patterson joined Lamson & Sessions in 1935 as merchandising director and immediately took charge of organizing and developing the automotive replacement division.

Before his connection with Lamson & Sessions, Patterson was widely known in the wholesale automotive trade through his active interest in the Automotive Engine Builders' Association, and having been a parts jobber at Indianapolis.

Porto-Power is WAR POWER
on the Home Front, too!
...keep it working to save
time and materials

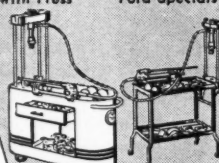


TO NEW MECHANICS — If this equipment is
around your shop—DO YOU KNOW HOW TO
USE IT? We want to show you how!



S-45 Standard Model S-200 S-100B De Luxe Models S-46 Standard Model with Press S-49 Standard S-44 & S-44A Ford Specials

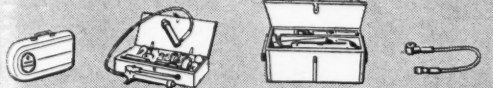
These drawings will help
you identify most of the
Porto-Power models
purchased during
the last 6 years!



S-100 & S-100A Original De Luxe S-50 & S-99 Original Standards



7 Ton Unit 10 Ton Unit 20 Ton Unit



BANTAM KIT S-59 Junior Body Ass't S-79 20 Ton Kit



R-263 Midget Ram

You new mechanics who are on the job today — youngsters and old-timers — have a big wartime job. If you have Porto-Power in your shop and it's still a mystery to you—Mister, it's "easy as pie" to learn how to use it. And—you'll be surprised how many of your jobs can be done better and faster the *hydraulic way*.

We want to help you. So here's a 48-page book crammed full of photos and short cuts. It gives you the "know-how" to handle a 1001 body, motor, frame, axle and spring jobs with Porto-Power. You can speed up service and repair — avoid replacements — and thus save vital materials — and on many jobs do the work of several men.

If your shop doesn't yet have Porto-Power, your Blackhawk Jobber may have one in stock for you. Or, if you have priority status, he may be able to arrange reasonable delivery from the factory — because Porto-Power is War Power on the home front, too!



● Get this Porto-Power SHOP MANUAL
now — without cost or obligation. SEND
COUPON AT ONCE!

BLACKHAWK

WORLD'S LARGEST MANUFACTURER OF HYDRAULIC EQUIPMENT

BLACKHAWK MFG. CO.
Dept. P643, Milwaukee, Wis.
Please rush Porto-Power SHOP MANUAL.

Name.....

Firm.....

Address.....

WHEEL ALIGNMENT

(Continued from page 23)

diagram, you notice that the axle is tilted backwards. That's caster. These three things, as you said a minute ago, are the ones that have to be right if a front end is gonna line up. Of course, the inclination of the king pin has to be right, but, before we get to that, let's get camber and toe-in fixed in our mind.

"You remember, in the early days, how the boys used to explain camber? They used to say the wheels were tilted so both of 'em would be

perpendicular to the old-fashioned crowned roads."

"I didn't go for that explanation," said Horace. "The rear wheels didn't have no camber and they didn't wear no faster than the front ones."

"The real reason for front-wheel camber," said Pop, "was the same then as it is now. It makes steering easier."

"In the old days, front wheels had as much as four or five degrees of camber. Tires in those days, remember, were high-pressure and king pins were vertical. The only way to get center-point steering was to give the



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OF YOUR WAYNE COMPRESSOR**

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YOU MUST make your Wayne Air Compressor last longer! That means you must give it occasional attention to keep the "gremlins" of destruction out. Check the oil level, clean the filter, blow out the water, see that the air intake is free from harmful grit, paint or acid vapors. Ask for a Wayne service man if serious trouble develops.

THE WAYNE PUMP COMPANY
FORT WAYNE • INDIANA

Buy More War Bonds!

AIR COMPRESSORS



"Careful you don't drop it; this stuff's expensive!"

wheels an excessive amount of camber."

"Here we go again," said Horace, pushing himself back in his chair. "That's the kind of talk Larry floored me with over at the wagon. What's center-point steering?"

"It just means," said Pop, "that the center line of the tire and a line drawn through the king pins cross each other at about the point where the tire touches the ground. Experience has shown that the farther these lines are apart when they touch the ground, the harder it is to steer the car. With vertical king pins, they would be several inches apart, so the wheels was cambered to get them closer."

"If the center line of the tire touches the ground too far outside the center line of the king pin, there is a tendency when the car is driven to make the wheels toe-out too much. And, on the other hand, if the tire center-line is inside the king-bolt line, the tendency is for the wheels to toe-in when the car is movin'. Cars today are built so that the center line of the tire touches the ground a little outside the center line of the king pin."

"That's pretty clear now," said Horace. "But you said a minute ago that the old cars used to have four or five degrees of camber and, as I remember, that's about right. But how come we don't need that much today?"

Pop leaned back in his chair and started to make explanatory motions with his hands. "How's the king pin set in a modern car—this way or that?"

"Its top is canted a little," said Horace, "toward the center of the car."

"Right. Now when the wheels and

(Continued on page 56)

CONSERVE

the life of cars and trucks



Keep 'em rolling safely. Reline with Wagner CoMaX Brake Lining

OUR Government has requested that all of us do our utmost to make our passenger cars and trucks last as long as possible. This means we must limit ourselves to ESSENTIAL driving only. It also means that we must give our vehicles constant care and proper upkeep.

Good brakes are one of the most important considerations in car and truck conservation. Drivers know that when a brake relining job is required it pays to insist on a quality brake lining because *quality* is essential to long-life and satisfactory performance. Jobbers and repair men do not have to be reminded that the very best in brake lining means Wagner CoMaX. Here are a few reasons why:

CoMaX is the finest in molded brake lining. It is

unsurpassed for quick, safe, smooth stops—so necessary for the safe transportation of our many war workers, and for the delivery of materials to fill war contracts.

CoMaX is long-lived. This means extra miles before lining replacement is necessary—and less frequent replacements mean more lining immediately available for war needs.

Other CoMaX features include reinforced backing—permitting deep seating of rivets and extending the period of safe usefulness; it is non-compressible, uniform in texture, easy on drums, and age-proof.

Wagner CoMaX meets every demand for a dependable and high-quality brake lining.



Available in sets, rolls and blocks. Ask your jobber, or write us for catalog and prices covering the complete line.

B43-4

AUTOMOTIVE
PARTS DIVISION

Wagner Electric Corporation

ESTABLISHED 1891

ELECTRICAL AND AUTOMOTIVE PRODUCTS

SAINT LOUIS, MO.

U. S. A.

WHEEL ALIGNMENT

(Continued from page 54)

the king pin are both straight up and down, the weight of the car tends to pull the wheels together at the top. That force results in side thrust on the king pins and side thrust makes steering harder. Nobody done much about it, though, till balloon tires came in. Then we run into a lot of shimmy and uneven tire wear.

"The reason was, a balloon tire has a much bigger area in contact with the road than a high-pressure tire has. When a wheel has a lot

of camber, the tire is actually a section of a cone, the diameter of the outside edge that touches the road bein' smaller than the inside edge. Now, when the wheel turns, the smaller edge tries to turn faster than the inside edge. This tendency causes the tire to scuff along the road surface, and the first thing we know both edges are wearin' away in cuplike depressions while the center ain't hardly worn.

"So they reduced the camber to a couple of degrees or less and that helped some, but it made steerin' harder. The only other thing to do

was to set the king pins at an angle, and they did. This kept the center-point steerin' and left the wheels almost perpendicular to the road. You'll hear mechanics say they took the camber outa the wheels and put it in the king pins. That's what they mean."

Horace pulled his chair closer to the desk. "You got camber pretty well straightened out for me. But"—he put a finger on an illustration in one of the manuals—"what's the reason for toe-in? It looks to me like you'd wear out tires faster with wheels twisted like that. I know you don't, but it looks like it to me."

"There's a couple of reasons for toe-in. Some people like one better'n the other, but I think there's some-thing to both of 'em."

"The reason you hear oftenest is that the front wheels have a tendency to toe out on a turn, so you toe them in when the car is stationary so as to compensate for it. Wheels do tend to toe out on turns, but there's another reason for toe-in."

"As I mentioned a while ago, a tire on a cambered wheel is a segment of a cone. The edge of the tire nearer the car would be the base of the cone, while the apex or tip of the cone would be an imaginary point well outside the car. Now what would happen if a car tried to roll on two real cones?"

Horace rubbed his chin a moment, then gave it up to scratch the point of his jaw. "Why, it wouldn't roll very far, I guess. Each one of the cones would roll right away from the car."

"Exactly," said Pop, "and that's what cambered wheels would try to do if it wasn't for toe-in. And—" he added quickly as Horace was about to speak—"there's another factor."

"We saw how the comin' of balloon tires led to excessive tire wear till they cut down on the camber. Well, reducin' the camber wouldn't eliminate the scrubbin' action of the tires altogether without the help of toe-in. Camber and toe-in work together. More camber requires more toe-in, less camber requires less toe-in. Get 'em both right and you get easy steerin' and cut down tire wear."

"I got it all straight so far," said Horace. "Now how about caster?"

"That," said Pop, "is another story. It's just as important as the rest. And then there's some more I'd like to tell you about the caster effect of king-pin inclination, and about toe-out. That, incidentally, was what Larry was talkin' about when he was needlin' you about steerin' geometry. But we'll go into that another evenin'. I won't have time now. I'm hungrier than a bear just comin' outa hibernation."

"Better get along home, then," said Horace. "That's one thing about food rationin'. It don't cut down a man's appetite none."

JOHNSON BRONZE



BEARINGS

Confidence

★ Confidence is the reward of merit. In bearings it is the natural result of improved performance . . . of longer bearing life . . . of smoother operation.

Johnson *Slip-in* Bearings deserve your absolute confidence. More than thirty years specialized experience governs their production. Leading car manufacturers specify them for original equipment. Your local jobber carries a complete stock. Try a set on your next job.

Write for New Catalogue

JOHNSON THE MOST COMPLETE SLIP-IN BEARING SERVICE IN THE WORLD **BRONZE**
SLEEVE BEARING HEADQUARTERS
455 S. MILL STREET NEW CASTLE, PA.



HELP! CAR ON FIRE!

Rust is "BURNING UP" metal cooling system parts that can't be replaced!

There's no smoke and flame to warn the car-owner, but within every unprotected cooling system water plus air are steadily oxidizing and "burning up" all parts made of precious brass, copper, aluminum and iron.

This is no time to permit vital metal parts to be destroyed or damaged by "rust fire." It's time for you to point out to every customer just what's going on in his car's cooling system—AND WHAT TO DO ABOUT IT.

Tell him about WARNER RADIATOR CLEANER. Show him how quick and easy it is to free the cooling system from all rust, sludge and oil muck. If he wants the cleaning job done right on the spot, use high-speed, heavy-duty WARNER SERVICE CLEANER.

Then show him how he can prevent

new rust formation in the cooling system with WARNER COOLING SYSTEM PROTECTOR—the amazingly efficient compound that not only prevents rust, but also guards metals against injurious chemical action from water.

Help your customers keep their cars rolling. Help yourself to new profits . . . IMPORTANT profits. Sell more WARNER Cooling System Products Now!

Get ready for our National Consumer Advertising (in color) appearing in Collier's NOW!



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TODAY!*



LEAKS?
WARNER LIQUID SOLDER
stops them quickly . . .
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**CARS KEEP COOL
FROM COAST TO COAST**

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COOLING SYSTEM PRODUCTS



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WARTIME TUNE-UP

(Continued from page 19)

destroy the radiator core and cylinder-head gasket, with attendant difficulties and destruction.

Of course, the most frequent request which will be made by car owners will be for better mileage and all that that entails. In many cases, all that will be required is a complete tune-up including carburetor, tappets, spark plugs and breaker points. However, it must be remembered that present-day low-speed driving tends

to increase carbon accumulation at a more rapid rate than did normal driving before fuel rationing. For that reason, it will be found necessary to scrape carbon much more frequently than heretofore. Furthermore, clean combustion chambers will permit carrying a more advanced spark with consequent improvement in fuel economy.

Of course, while the heads are off for carbon scraping, valves should also be ground and, in this connection, many automotive mechanics are profiting by the experience of aviation mechanics and are paying more attention to lapping the valves after

the valve and seat have been refaced. Valves and seats should always be checked by the Prussian blue or pencil line test to make sure that the seat extends for the entire circumference. Seats should be approximately 3/32 in. wide.

If there is no necessity for a carbon-and-valve job, it will generally be found advisable to use some tune-up oil in order to free any valves which may have a tendency to stick.

With warm weather approaching, carburetor accelerating pumps can be adjusted to the shortest stroke and, where the utmost in gasoline mileage is desired, smaller main jets can be installed. In general, one size smaller is all that is desirable; however, in extreme cases, two sizes smaller can be used if the owner does not object to a reduction in performance. In each case, fuel levels should be checked and if the carburetor is fitted with a metering rod, this should be checked with the correct gage.

Spark plugs and spark-plug gaps should also receive particular attention during this spring tune-up season to get the best economy. Of course, the plugs should be clean and, when it comes to setting the gaps, most mechanics will stick to what is called for in the specification tables. However, it must be remembered that such specifications were set up for peacetime driving when speeds ranged up to the wide-open throttle mark. Today's ceiling of 35 m.p.h. is another story, however, and, by increasing the plug gaps by about five thousandths, it is possible to squeeze a little more mileage from each gas coupon.

Naturally, breaker points and distributors want to be just about perfect for best economy and it is doubtful if an apprentice can do a good job of cleaning up a set of pitted breaker points. When it comes to setting the timing, best mileage is gotten by bringing it up to the pinging point and then backing off just enough to stop the ping. Of course, if a dynamometer is available, that's the thing to use.

Probably the most important job in any tune-up job—and one that is often forgotten—is to start off with a check of the compression. That's a job that any beginner can do for you and you can't do a tune-up job worthy of the name unless the compression is up to standard in each cylinder.

Heads Branch

The appointment of F. J. Urquhart as regional manager of the South Bend Branch has been announced by K. B. Elliott, vice-president of The Studebaker Corp. Urquhart entered the automobile industry in 1920 and successively handled important executive assignments in factory parts, service, customer relations and promotion departments.



To help supply the tremendously increased demand for sealing materials of all types for our military forces and war industries, Fel-Pro has added new buildings, increased plant capacity and developed new products. Among these is Thiokol Strip Material, whose spongy, rubberlike characteristics make it suitable for army vehicle tailgate moulding and many other purposes.

But we feel that one of our most important responsibilities at this time is to continue to supply the sealing material needs of the automotive service industry, which has the vital war job of helping keep essential transportation rolling. We can deliver, without lengthy delays, most of the Fel-Pro products listed.

- ★ ★ ★ ★ ★
- ★ **Keep 'em Rolling** ★
- ★ **with FEL-PRO** ★
- ★ **GASKETS**—for every automotive application. ★
- ★ **PACKING**—for water pumps, bearing seals, etc. ★
- ★ **GREASE RETAINERS**—in sizes and types to fit all cars. ★
- ★ **TAPE**—Woven Asbestos Lining Tape — Twisted Asbestos Wicking. ★
- ★ **MANY OTHER** Automotive Sealing Products. ★
- ★ *Most of these products are available packaged in boxes or sets.* ★
- ★ ★ ★ ★ ★



Felt Products Mfg. Co. 1521 CARROLL AVE., CHICAGO, ILL.

**American
Brakeblok**

BROWN LIPE

Spicer

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Belden

GRAPHO

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RAYMOND

**MONMOUTH
PRODUCTS**

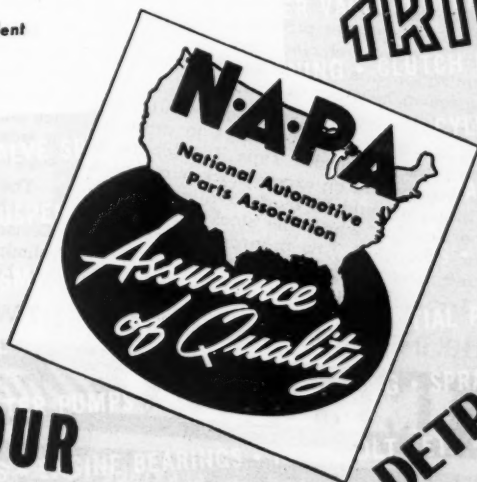
**Wherever you are -
Whatever you need -
Whenever you need it -**

**YOUR NAPA Jobber
IS A GOOD MAN TO KNOW**

BACK of your NAPA jobber stands the largest independent organization in the automotive parts industry—with master stocks of more than fifty essential lines in 38 warehouses that cover the nation—with the “know-how” that means so much in getting you *what* you need *when* you need it! The NAPA Seal is confirmation of the quality of every part that bears it.

NATIONAL AUTOMOTIVE PARTS ASSOCIATION
Executive Offices: 705 Fox Building, Detroit

A Nation-Wide Organization of Independent
Warehousing Distributors



DITTMER

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PRECISION

FEDERAL

TRICO

DETROIT

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A.P.C.

MARTIN-SENOUR

PURITAN

DUCKWORTH

**Buffalo
MUFFLER**

BALKAMP

UNITED

CELORON

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WISCONSIN

PURITAN

**DOUBLE
DIAMOND**

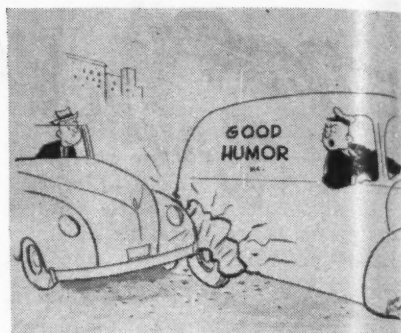
DETROIT LETTER

(Continued from page 39)

during the year, 296, or 61 per cent, took war plant jobs, 113 or 23 per cent, entered the armed forces and the remaining 75, or 16 per cent, quit for other reasons.

The U. S. Employment Service in Detroit, which last year was luring men away from the service shops to take "essential" jobs in war industry, now is vainly trying to get some of them to return to their repair jobs in order to avert a breakdown in

transportation. Automotive and maintenance mechanics, body repairmen, electricians, radio repairmen, sheet metal workers and welders all have been declared "essential" by the War Manpower Commission. Recently Montague A. Clark, Detroit district director of the WMC, sent letters to the 29 largest employers in Detroit urging that former transportation maintenance workers in their plants who are not working at their highest skills be released to return to their former occupations. So far, the response has not been great. However, even before this letter was written a few mechanics, lured to war factories by



"The opinions I am about to express are my own, and not necessarily those of this company!"



• These are days when it takes a good deal of ingenuity and scurrying around to keep service and repair work under way—particularly on any item normally made of copper and brass such as tube fittings.

Imperial fittings are pouring out by the millions for use on war equipment and production machinery. However, it is also important that automotive transportation be kept going, whether private passenger cars or commercial vehicles and the Imperial organization has been following a definite program to help out on this.

First: The Imperial Trading Post has been established to enable Jobbers to draw on each other for stocks. Thus if a Jobber in one locality had an excess stock of one type of fitting it could be made available in another locality where the stock of that item was exhausted. This program has relieved many emergency situations.

Second: Detailed information for Jobbers

has been prepared which shows how to substitute one fitting for another and how parts of different types of fittings can be used to make up combinations that will solve a particular problem. This information is now being prepared in chart form and will soon be available to service men through their Jobbers. It will cover compression, flare, inverted flare, type D and pipe thread fittings.

Third: Imperial has a line of plastic fittings and tubing that supplements the regular line of brass fittings and copper tubing. This plastic line has already enabled service men to handle emergency repairs where it was impossible to get brass fittings and copper or steel tubing.

The Imperial organization is working closely with your Jobber and the Industry Division of the War Production Board to eliminate any possibility of cars being laid up because of tubing connection failures.

THE IMPERIAL BRASS MFG. CO., 1217 W. Harrison St., Chicago, Illinois

IMPERIAL Automotive Products

TUBE FITTINGS ★ FLEXIBLE TUBING ★ TUBING SERVICE TOOLS
BATTERY TESTERS ★ FREEZETESTERS ★ WELDING OUTFITS
Order from your JOBBER

the talk of big wages, had returned to their old jobs in the shops because they became tired of the monotony of production work.

To help meet the problems of maintaining essential transportation, Clark has appointed a six-man management-labor advisory committee for the Detroit area. Members are Allen Dean, of the Board of Commerce; Henry Whiting, president of the Detroit Auto Dealers Association; Don Smith, secretary of the Michigan Trucking Association; James R. Hoffa and Samuel L. Hurst, of the Teamsters' Union (AFL), and Ray Dooe, of the UAW-CIO. A study by the committee showed that in all Detroit's large and medium-size public service garages service is hampered by lack of skilled labor. One of the largest repair shops in the city, which normally serviced 50 cars during an eight-hour shift, now averages only 30 cars per shift. Another large shop reported a daily net loss of 20 per cent in service capacity. A used car agency which formerly reconditioned 25 cars per day now averages only 15 daily.

More than 25 per cent of Detroit's local delivery trucks are out of service because of lack of drivers and dock workers or waiting for repair work, according to Dean, one of the committee members. At least four freight carriers have an outright embargo against merchandise that is not directly in the stream of war production, due to lack of manpower.

Selective Service officials are co-operating by granting deferments of one to 12 months for key automotive service employees in order that replacements can be trained. However, no permanent deferments can be allowed. Hiring of women has helped relieve the situation to some extent, especially in the unskilled jobs. In larger service establishments, women are serving as door tenders, floor drivers, gasoline pump attendants, car washers, tool-crib helpers, parts selectors and timekeepers. A few have been broken in as mechanics' helpers, notably at the Packard retail branch. However, Studebaker, Chrysler, Chev-

(Continued on page 62)



"Betcha Dad worked on those engines!"

They're talking about a Flying Fortress powered by Studebaker-built Wright Cyclone engines

JUST a little while back, expert machinist John H. Williams and his two sons, Evard and John, were working together at Studebaker.

Today, they're still working together in spirit—but many miles apart.

The father is building Wright Cyclone engines for the mighty Boeing Flying Fortress in the Studebaker factory. The boys have hung up their working clothes to put on the fighting uniforms of Uncle Sam.

There are many families such as the Williams family whose names shine brightly these war days on the Studebaker roster—families

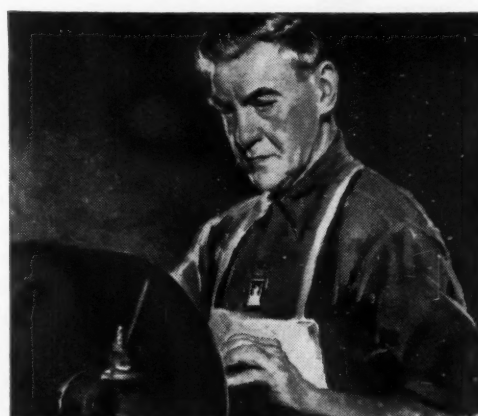
that are steadfastly maintaining the great Studebaker father-and-son tradition at home or far away.

And when the fighting job is done, that tradition will be exemplified again in outstanding Studebaker motor cars and motor trucks for civilian use. The solid principles that underlie Studebaker craftsmanship will remain unchanged.

BUY
U. S. WAR
BONDS

STUDEBAKER

Builder of Wright Cyclone engines for the Boeing Flying Fortress, big multiple-drive military trucks and other vital war matériel



Craftsman father of craftsmen sons! John H. Williams has been with Studebaker 21 years. He is one of many Studebaker veterans whose aptitude for fine work inspired their sons to become Studebaker craftsmen, too. Studebaker employees are proud of their assignments in the arming of our Nation and its Allies.

DETROIT LETTER

(Continued from page 60)

rolet and Buick also have urged their dealers to help compensate for the loss of manpower by hiring women for the lesser skills in the shop.

The effects of automobile, tire and gasoline rationing upon the automotive retail trade are revealed by reports on tax collections to the Michigan Dept. of Revenue. The number of automotive retail outlets declined 19 per cent between January, 1942, and January, 1943, dropping from 16,-

840 to 13,619. However, retail sales of this group fell nearly 50 per cent on the basis of state sales-tax returns. The number of passenger car and truck dealers was off 22 per cent, declining from 2,293 to 1,772 in the 12 months. However, their sales were down 78 per cent in January, 1943, compared with the same month of 1942. Twenty-one per cent of the service stations went out of business during the year, the number decreasing from 10,373 to 8,228, a loss of 2,145. Whereas automotive retail outlets paid 14.6 per cent of the state sales and use tax in January, 1942,

this group accounted for only 6.5 per cent of such tax revenue in January, 1943.

TRUCK REARS

(Continued from page 27)

To disassemble the differential, remove the lock wire from the differential bolts and remove the bolts. Lift the right-hand side of the case from the left-side and the differential gears will be exposed. Take out the right-hand side gear and lift off the gear-to-case thrust washer. Remove the spider and four pinion gears from the left-hand case. Slip the pinion gears and thrust washers off the spider. Take the left-hand side gear out of the left hand case and remove the thrust washer. The differential side-bearing cones may be removed from the case halves with a puller or by using a punch through the holes in the case halves.

Clean and thoroughly inspect all parts. Any parts showing damage or excessive wear should be replaced.

Hints on Back Orders

Motor and Equipment Wholesalers Association has just issued "Back Orders," a comprehensive and instructive study on how jobbers are handling the difficult problem of back orders which is particularly troublesome under present conditions. The study is therefore very timely and deals with a subject of special interest to all automotive wholesalers.

It consists of a large number of reports from members of the association on just what methods they have found to be best in meeting the present back-order situation. These reports are presented in a booklet just as they were given to the association. They, consequently, are first-hand both in content and expression. Because of that they have especial value.

Copy of the booklet on "Back-Orders" is available upon request to M.E.W.A. headquarters.

Martin Schiff

Martin Schiff, chief engineer of the Century Electric Co., St. Louis, died suddenly Feb. 15.

Schiff was born in New York City Oct. 7, 1890, and was graduated from Cornell University in 1912. Before joining the Century organization in 1933 he had been employed as assistant chief engineer and assistant to the president of the Imperial Electric Co., Akron, Ohio, from 1929 to 1933. From 1916 to 1919 he served in the U. S. Navy as a Lieutenant. He was a fellow member of A.I.E.E. and a member of the Engineers' Club of St. Louis.

IT'S A CINCH TO FIT AN

ARROW

SEALED BEAM KIT

Here's the quick, easy way to put modern Sealed Beam Headlamps on pre-1940 Trucks, Cars and Buses. There's an ARROW Kit to fit practically every model. The all-glass sealed lighting unit gives far better visibility . . . makes night driving much safer . . . and does not deteriorate like the old style lamps because they are completely protected from weather, dust and corrosion. To garage and independent repair men this is a double profit opportunity. You cash in on the sale of the kits . . . and you get paid for the installation. See your jobber salesman for complete information or write direct to Dept. 180.

ADJUSTABLE MIRRORS

MARKER LAMPS

ELECTRIC FLARES

TURN SIGNALS

ARROW SAFETY DEVICE CO., Inc.

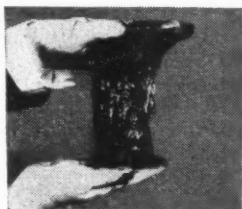
MEDFORD, N. J.

"*NOW* I insist on the dealer who can MARFAK my car!"

"Now that we are all taking mighty good care of our cars, we pay more attention to important details like chassis lubrication. I kept reading about Marfak in the magazines and hearing about this different kind of lubrication on the Fred Allen program and from my friends. A demonstration proved it first and then actual driving clinched the value of Marfak for me."

* * *

Mr. Dealer—that's about the way lots of car owners figure it out today—and end up by going to dealers who can Marfak their cars. Once they have had a dealer demonstrate the qualities of Marfak they are usually sold. And once they have it in their cars they *come back* for Marfak.



Show your customers how Marfak sticks to its job, resists wear-out, wash-out and squeeze-out. Marfak does a superior job. Build your lube profits with this famous Texaco chassis lubricant that you can demonstrate is different. Let a Texaco man show you how easily and simply you put on this demonstration... and get more cars on your lift!

Talk to your Texaco man, 'phone the nearest of 2300 wholesale distributing points or write The Texas Company, 135 East 42nd Street, New York, N. Y.

TUNE IN: FRED ALLEN every Sunday night—C. B. S.



YOU CAN MAKE MORE

MONEY WITH MARFAK

Air Navigation

In "Air Navigation for Beginners," Lieut. Com. Scott G. Lamb, U. S. N., presents for high-school and individual students an elementary text that has timely appeal and should perform a vital service during the war. It is written in clear, simple language which can be readily understood by persons without previous training.

Commander Lamb, who is instructor in navigation at the Air-Mar Navigation Schools at the Franklin Institute in Philadelphia, not only knows his subject thoroughly but also has the gift of imparting it quickly to

even the untrained reader. The drawings are particularly clear and helpful.

The volume is published by the Norman W. Henley Publishing Co., New York, and is priced at \$1.50.

Ambulance Conversions

Installation of special equipment, whereby station wagons and light panel body trucks may be converted into emergency ambulances, was recently made for the St. Clair Shores, Michigan Office of Civilian Defense, by Swift Firt-Aiders, a Detroit concern specializing in ambulance conversion devices.

Graham Rejoins Grizzly

To enable him to rejoin Grizzly Manufacturing Co. in his former capacity of service engineer, Art Graham has just received his honorable discharge from the U. S. Army.

Art served in the armed forces about one year. He was stationed at Camp Calan, San Diego, Cal., in the anti-aircraft artillery and was an instructor on guns and searchlights at the replacement center there.

Art's release permits him now to resume, throughout his old West Coast territory, the important work of helping to keep vital automotive transportation rolling.

Harry D. Smith Named

First Vice President

Harry D. Smith, of New York City, has been named First vice president and executive engineer of Globe Hoist Co., Philadelphia and Des Moines, according to an announcement just made by F. W. Swanson, president of the concern.

For the past 15 years, Smith has been head of his own organization at 33 West 60th St., New York City, where he represented the sale and engineering application of automotive service equipment . . . including Globe's line of car lifts, bus and truck lifts and hydraulic industrial lifts.

Smith is making his headquarters for Globe at Philadelphia.

Wire Sales Transferred

Sale of Auto-Lite Automotive Replacement Wire and Cable has been transferred from the company's Wire Division at Port Huron, Mich., to the Merchandising Division, Toledo, Ohio, according to an announcement by The Electric Auto-Lite Co. F. A. Nealon, Merchandising Division sales manager, will direct sales and promotion on these products in addition to Auto-Lite Spark Plugs, Driving and Passing Lights, Lenses and Sealed Beam Units.


Doubles Plant Space

Unable to keep up with the mounting demand for auxiliary lighting equipment, Arrow Safety Device Co. has found it necessary to expand beyond their present facilities in Medford, N. J. The new plant will be in Mt. Holly, N. J.

H. P. Schade, vice-president in charge of sales, and R. M. Rauch, new general manager, are both looking forward to the near future when they can have production up in line with current orders.

IT'S THE AIRTEX MARK OF

Superior Performance




It's the identifying swatch of AIRTEX Diaphragm Material attached to every new or exchange AIRTEX Fuel Pump. Look for it!

AIRTEX

Precision Made

FUEL PUMPS



You can tell an AIRTEX Fuel Pump instantly by the small triangular sample swatch of AIRTEX Diaphragm Material that's attached to every new or exchange AIRTEX pump. This new AIRTEX triangle reminds the buyer unmistakably of the AIRTEX Diaphragm that's guaranteed for 50,000 miles . . . his assurance of superior fuel pump performance and lasting service.

Write to your jobber for the AIRTEX dealer proposition. Remember — your profits climb with the AIRTEX line.

AIRTEX 3-WAY SERVICE

1. Diaphragm Kits for minor repairs.
2. Repair Kits for emergency repairs.
3. Complete Exchange Service that gives you factory rebuilt pumps with the AIRTEX 50,000 Mile Guaranteed Diaphragm, at a low exchange price.

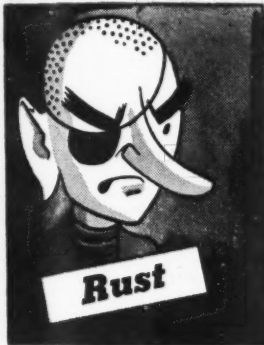
Complete stock of new AIRTEX Fuel Pumps still available for all cars and trucks.

AIRTEX AUTOMOTIVE CORP. FAIRFIELD, ILL.

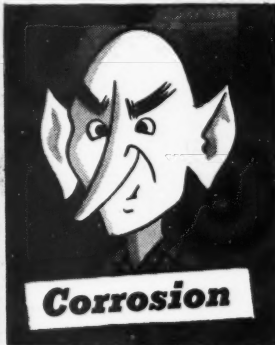
WANTED!

FOR "GAS" LARCENY

Watch Out for the "GASLIN" Gang!



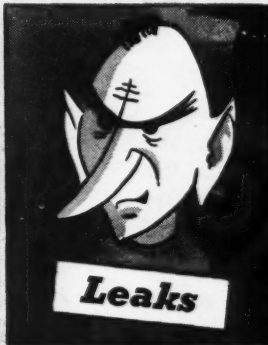
Rust



Corrosion



Loose Connections



Leaks



Blow-outs

Leader of the "Gaslin" gang Ruins mufflers and exhaust systems. Clogs interiors with scale

Public enemy No. 1, destroys mufflers by silently eating out interior parts. Watch for corrosion the gas thief.

Wanted in 48 states for gas larceny Releases deadly gases and noise. Dangerous to driver. Robs the motor of efficiency.

Many convictions for manslaughter. Often kills or stuns victims with deadly carbon monoxide—causes many accidents.

Another man killer. Easily apprehended through noise and smoke. Convicted many times of pilfering gas ration coupons.

THE "GASLIN" GANG'S FAVORITE HANG-OUT!

Watch the
EXHAUST PIPE
For Leaks
and Rust

Watch the
MUFFLER
For Rust,
Corrosion
and Blow-outs

Watch the
MUFFLER
for
Loose
Connections

Watch the
TAIL PIPE
for Leaks,
Corrosion
and Loose
Connections

WATCH THE EXHAUST SYSTEM FOR "GASLINS"

Also suppliers of
vital materials
for our armed
forces

REPLACE with

MAREMONT

Terne-plate **MUFFLERS**

MAREMONT AUTOMOTIVE PRODUCTS, INC., 26 Ashland Ave. at 17th St., Chicago, Ill.
Also Manufacturers of MAREMONT alloy-steel Springs for Cars, Trucks and Busses

KEEP THAT
PLEGE

Pledged
U.S. TRUCK
CONSERVATION CORPS

LEGALLY SPEAKING

A lawyer's interpretation of federal and local court decisions of interest to repairmen, presented each month

By C. R. ROSENBERG, JR.

Paying Debt Without Money

It's true, as the Supreme Court of Texas said recently, that money isn't everything even in paying debts and

that a debt can be paid without cash.

"A creditor and a debtor," said the court, "may make and support satisfactory payment of a debt otherwise than in money. As between a debtor

and a creditor, anything may be agreed upon as satisfaction; and whatever is accepted by the creditor in satisfaction is effective as payment and discharges the debt."

Meaning that a repairman can make himself a trade deal, as many repairmen do, by paying a debt by doing certain work on the creditor's car. That work is just as good as cash to pay the debt if the creditor accepts it.

But suppose the creditor later regrets the deal and sues the repairman for the money, denying that he took the job in full payment. Nasty for the repairman unless he can prove the deal.

Good plan in such a deal is for the repairman and the creditor to exchange receipts or else for the repairman to get a complete "release" from the creditor reciting that the release is given in consideration of the work done by the repairman on the creditor's car. (*Gulf vs. Continental*, 164 *Southwester Reporter*, second series, 488).

Competition from Former Employee

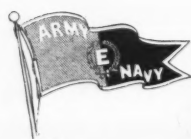
When a repairman's employee becomes popular with the customers, what's to stop him from quitting and starting his own shop and perhaps attracting a number of customers away from his former employer?

He can't be stopped from quitting, of course, but he can be stopped from competing with his former employer for a fixed length of time after he quits or is discharged and within a stated area or distance from his employer's shop. It can be accomplished by requiring him to sign an agreement, while still employed, to the effect that, in the event of the termination of his employment, voluntarily or otherwise, he will not engage in the same line of business in any way for a stated length of time or within a given area.

Such agreements are upheld by the courts wherever the length of time and the forbidden area are reasonably proper for the employer's protection from competition by his former employee. In a recent Ohio case, an employer engaged in a retail line of business required an employee to sign an agreement not to engage in a similar business within a radius of 25 miles from the place of employment for a period of two years. When the employee, after his employment ended engaged in business in violation of this agreement, the former employer asked the Ohio court to restrain him. Accordingly, the court ordered the former employee to cease his business activity in violation of the agreement and said:

"The radius of 25 miles agreed upon covers the employer's business (Continued on page 68)

CONTINENTAL RUBBER WORKS



The critical part rubber is playing in winning the war has, from the first, placed a definite responsibility on Continental. Because of its forty years of specialized experience in the manufacture of industrial and mechanical rubber goods, Continental has helped our Armed Forces solve many of their unprecedented rubber problems. Wherever rubber—natural, reclaimed or synthetic—is demanded for war work, Continental stands ready to place its engineering and research experience at the command of the manufacturer or user.

CONTINENTAL RUBBER WORKS
makers of the VITALIC



ERIE, PENNSYLVANIA • U.S.A.
line for forty years

THEY ARE FIGHTING A GOOD FIGHT! ★ ★ ★

When the full history of America's war effort is written, the performance of the nation's automobile dealers in keeping motor transportation efficient will be recognized as one of the most notable of civilian contributions to our victory.

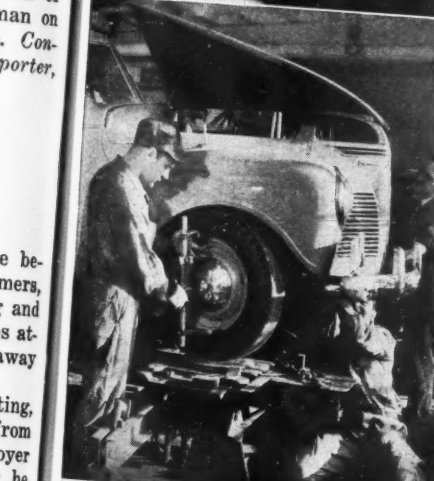
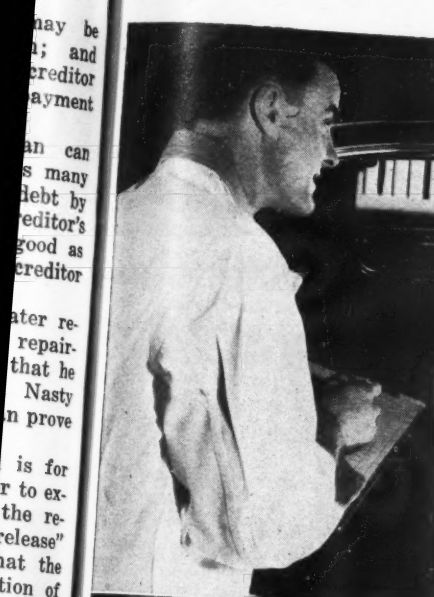
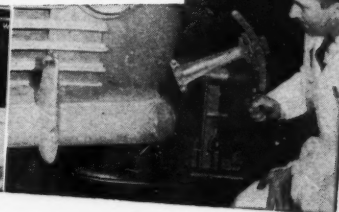
Not only are the dealers doing a job of heroic proportions under many handicaps but most of them are doing it in a truly patriotic spirit. In some cases, they are performing their duty at a considerable personal sacrifice, keenly conscious of the fact that if they fell down, America's personal transportation fleet might be so seriously crippled as to interfere with the successful prosecution of the war.

We are particularly proud of the record that Chrysler Dealers are making under these trying conditions. They are showing a keen realization of their responsibilities to the owners of our products. They are doing everything possible to make the owner of a Chrysler or Plymouth car glad that he selected that car above all other makes for such a trial of stamina and reliability as these emergency conditions entail.

We are proud, too, of the manner in which our cars are standing up under the punishment of restricted driving and its attendant "still wear". That they should perform so well under conditions that are altogether foreign to those for which they were designed proves inherent excellence of their design, materials and manufacture.

Between the courtesy and efficiency of our dealers in providing adequate service for these vehicles and the manner in which the cars are acquitting themselves, we feel certain that the dawn of peace, whenever it may come, will find us bound by closer ties to our old friends and with a vast group of new friends. Only in adversity can the true worth of an organization or a product fully be demonstrated. And we feel that this "trial by fire" in giving added proof that Chrysler dealers and Chrysler and Plymouth cars truly merit the utmost in public confidence.

CHRYSLER
DIVISION
CHRYSLER CORPORATION



LEGALLY SPEAKING

(Continued from page 66)

activity. This covenant as to radius was therefore proper. The time element of two years is fair and reasonable."

The restrictions as to time and area or radius that the courts will uphold in behalf of the employer, depend on the nature of the business and all the surrounding circumstances. The general rule is that they should be "reasonably necessary and proper" for the employer's protection. (*Liv-*

ington vs. Stern, 43 *Northeastern Reporter*, second series, 303.)

May Avoid But Not Evade the Law

Foresight to avoid the unfavorable effects of an anticipated law is applauded even by the courts; but that's an entirely different thing from an unlawful attempt to evade a law already in effect.

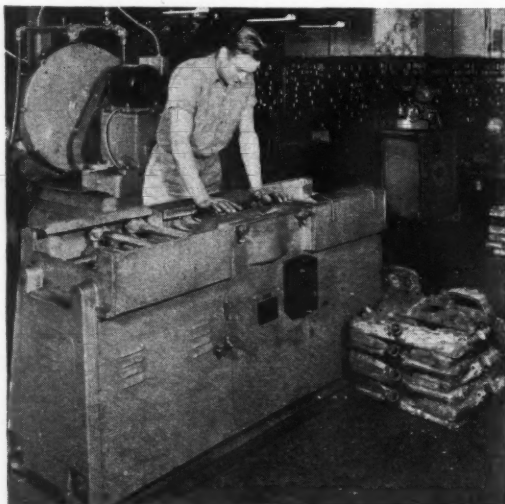
In a recent federal court case, a small manufacturing business had been reorganized so as to avoid the impact of the Wage and Hours Act

before that law went into effect. There was no fraud or evasion involved in the reorganization of the business.

The admitted purpose was to escape the provisions of the act. Was such reorganization therefore illegal?

"It is not unlawful," said the Federal court, "to so plan one's business affairs, that the effect thereon, of legislation, may be avoided; it is only unlawful to evade *after* the law becomes effective. To avoid payment of taxes by refusing to sell property at a profit has never even been held reprehensible; to evade taxes after a sale at a profit is both reprehensible and illegal."

No harm, therefore, in a repairman's rearranging his business and affairs to avoid the unfavorable effect of anticipated legislation not yet in force. (*Walling vs. Plymouth*, 46 *Federal Supplement*, 433).



Lempco's E Award is for Outstanding War Production.

WET GRINDS . . .

- ★ Cylinder Heads and Blocks
- ★ Intake and Exhaust Manifolds
- ★ Fuel Pump Bodies
- ★ 100's of Other Jobs!

Earns \$450 in 1st 60 Days!

One man can regrind plenty of heads in an 8 hour day on the Lempco Wet Surface Grinder pictured above. At \$4.50 a head (average) it pays a fine profit. You can make those profits in your own shop—today! Because there is a big volume in cylinder head regrinding for the shop that goes

after it! What's more Lempco has the copyrighted formula that gets this business for you . . .

Volume INSURED by

Clever New Plan . . .

Copyrighted gasket merchandiser enables you to boost gasket sales into head regrind jobs. It's FREE!

Write for details—today.

WRITE TODAY FOR THE WHOLE STORY!

PROMPT DELIVERY!

LEMPCO
PRODUCTS INC.
BEDFORD OHIO U.S.A.
ESTABLISHED 1919

SEE ONE WORK—MAIL COUPON

Lempco, Dept. MA, Bedford, Ohio
GENTLEMEN: Tell me shop nearest me where I may see a LEMPCO Grinder in operation.

NAME
ADDRESS
CITY..... STATE.....

Employee or Independent Contractor?

Repairmen may find much of practical value in the legal distinction between employees and independent contractors. An employer must pay unemployment insurance and social security taxes for employees who work for him, but not for independent contractors who serve him; he is responsible for the acts of his employees in the course of their employment but not for anything done by independent contractors handling his work.

Trucking or delivery service furnishes an easy example of this distinction. If a business man has his own delivery truck operated by his own driver under the boss's detailed instructions and directions, the driver is an employee. But if the business man makes a deal with a so-called public hauler to take care of his deliveries, without any detailed control by the business man, the public hauler is an independent contractor.

Where one person is performing work for another, and the person for whom the work is being done has full and detailed control of the ways, means, manner and time of the other's performance, the relationship is that of employer and employee or, as the courts often call it, master and servant. But where there is no such complete control and the person performing the work is responsible for results rather than for manner and methods, he is an independent contractor.

"The true test of an independent contractor," said a California court in a recent case, "is that he renders service in the course of an independent occupation, following his employer's desires in the results but not in the means used." (*People vs. Grier*, 128 *Pacific Reporter*, second series, 207).

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Increase your business... Help win the war...

Urge your customers to

CONSERVE

the life of cars and trucks

by having hydraulic brake systems checked regularly



Colorful half-page Wagner ads in the Post and in Collier's regularly remind automobile owners of the importance of keeping the hydraulic brake system of their cars in good operating condition. You can do your part in following through by offering to check the level of the brake fluid in all cars you service.

**When additional fluid is needed, use
WAGNER LOCKHEED
No. 21 HYDRAULIC
BRAKE FLUID**

No. 21 is recommended for *all* hydraulic brakes. It retains its highly efficient qualities under all driving conditions. It completely and properly mixes with all other approved fluids, furnishes necessary lubrication for working parts of the hydraulic brake system, and in general, preserves the essential characteristics of the entire system.

Please be assured that Wagner, through Wagner jobbers, is doing everything possible to keep you and other dealers supplied with No. 21 fluid. Whatever the size or shape of container, Wagner No. 21 will be readily recognized by the familiar red, white and blue design with No. 21 in the circle.



**Whenever brakes need to be repaired - - you'll get parts
of the highest quality by specifying Wagner Lockheed**



There is a Wagner jobber near you who can supply Wagner Lockheed Brake Fluid. He can also supply Wagner Lockheed Hydraulic Brake Parts for repairing brakes on all makes of cars and trucks. If you don't know his name, please write us today.

Wagner Electric Corporation

ESTABLISHED 1891

6400 Plymouth Avenue, St. Louis, Mo., U. S. A.

ELECTRICAL AND AUTOMOTIVE PRODUCTS

H43-7



Hydraulic Equipment

To meet wartime buying problems, Blackhawk Mfg. Co. has issued a new Hydraulic Equipment Catalog listing only those items scheduled for production.

By omitting products "discontinued for the duration," the book aims to eliminate delays caused by orders on which practical substitutions must be arranged.

This catalog reveals that Blackhawk remains in production on hydraulic hand jacks from 3 to 50 tons capacity; 4-ton wheeled service jacks; numerous gage-equipped jacks; 7, 10, 20, and

50-ton "Porto-Power" hydraulic units; and "Porto-Power" maintenance and motor vehicle assortments and pipe benders.

Actually, the practical range of the line is retained, but production is scheduled only on models, within each classification, which have the greatest general service in the war effort.

As a further innovation, this single 12-page catalog replaces eight various peacetime bulletins. And, in the interest of simplifying the wartime buyer's job, it does not include used photos and peacetime merchandising data. But it does have added specifications and answers to questions

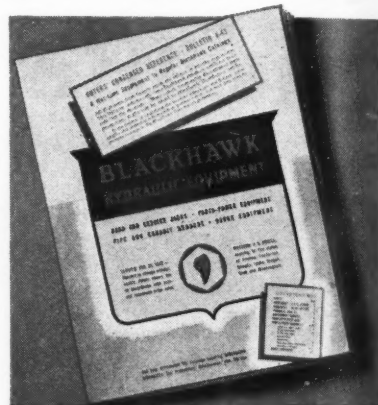
America's motorists now not only realize there'll be no cars until the end of the War, but are beginning to understand that the timetable of War is definitely off schedule. The indefinite prolonging of war activities means that America's cars must be made to stretch just that much farther. Come Spring, protecting the OUTSIDE as well as the inside of a car will mean more than ever protecting an invaluable investment—minimizing depreciation of eventual trade-in value.

It's your chance to make your future brighter—and a nice profit to boot by using McAleer Protective Maintenance Materials in your service operations—starting NOW, while the using is good.

Top money-maker for servicemen among automotive refinishing materials has always been McAleer SPEEDIE-RUB. This original double-quick, heavy-duty rubbing compound together with the 2-Way POLISH & CLEANER and QUICK-wax gives you a three-way, profit-making team that offers a complete service to your customers.

Give one, two or all three items a chance to prove themselves in your refinishing service operations. They are the Spring Tonic that is bringing back the bloom o' health to the cheeks of many a service department bankroll—they can do the same for yours. Order from your local Jobber or direct from the Factory.

McAleer **MANUFACTURING CO.**
Quality-Controlled Finishing Materials
ROCHESTER, MICHIGAN



which in the past have prompted phone calls, wires and correspondence.

The catalog, No. V-43, is available from Blackhawk distributors or can be had by writing direct to Blackhawk Mfg. Co., Milwaukee, Wis.

Wartime Service

Keyed to changed conditions in automotive service brought about by the war, the Wartime Service Handbook, published by United Motors Service, Inc., Detroit, is now available to the nation's automotive service industry.

Driving conditions are different, and many a part or unit that would not function under high-speed, long-distance driving, will, with proper adjustment, perform under enforced low-speed, short-distance driving. Instructions in this new handbook place major emphasis on how to repair rather than how to replace units.

Plainly written and containing a wealth of "show how" illustrations, the handbook includes instructions for the wartime servicing of bearings, brakes, charging circuit, cooling system, fuel system, gages, ignition, lighting, radio, shock absorbers and starting system.

In a foreword, automotive service men are reminded that the millions of privately owned motor vehicles carry more passenger traffic than all other means of transportation combined, and that, in the maintenance of this essential transportation system, every effort must be made to conserve materials needed for war production.



ADMINISTRATION BLDG. CAMDEN, N. J.



FACTORY, CAMDEN, N. J.



FACTORY, CANADA

R. M. HOLLINGSHEAD CORPORATION

CABLE ADDRESS
"WHIZ - CAMDEN"

CAMDEN



NEW JERSEY

CODES: BENTLEY'S, ETC.

Mr. P. A. Streich
The Saturday Evening Post
Philadelphia, Penna.

February 5, 1943

Dear Mr. Streich:

We believe the attached contract for our 1943 SATURDAY EVENING POST advertising will be quite a surprise to you, particularly so when you realize that this represents the largest single appropriation ever set aside by our corporation for advertising in a publication of this kind.

Our decision to concentrate our advertising effort in the SATURDAY EVENING POST this year has been prompted by a number of opportune developments, including these important factors:

1. The essential need for continuing careful maintenance of automobiles and trucks throughout the land.
2. The remarkable success our POST advertising has had in the past.
3. The new and outstanding editorial policy adopted by the POST, which we believe will surge its reader interest and advertising effectiveness to greater heights.

Couple with this our position as the world's leading producer of automotive maintenance products, the powerfully supported program we have set up for our dealers and jobbers on WHIZ MOTOR RYTHM, and the unusual respect your publication commands among the automotive trade and America's millions of motorists . . . and we have the makings of the biggest program ever put behind a product or group of products of this kind.

We feel confident that with the aid of our colorful year 'round POST advertising, WHIZ MOTOR RYTHM will enjoy greater sales than ever before. We're proud that the SATURDAY EVENING POST will be working with us to attain this goal.

Very truly yours,

R. M. HOLLINGSHEAD CORPORATION

Stewart Hollingshead
Stewart Hollingshead
Vice President

TELLING MILLIONS IN CITY AND COUNTRY ABOUT WHIZ MOTOR RYTHM

"Saves up to 1/3 of Gas"

and other Whiz
automotive main-
tenance products:

Polishes — Tire
Preservatives
— Radiator
Specialties.



IN THE NEW POST
FOR THE NEW AMERICA

Grey-Rock Salesmen Hold 3-Day Conference

Grey-Rock salesmen from all over the United States and Canada met at Lancaster and Manheim, Pa., for a three-day wartime sales conference, Feb. 21-23. Sales problems confronting the automotive business in general and the brake-lining business in particular were threshed out, and the tone of the conference was one of optimism.

The company's 1943 advertising and merchandising plans were presented by Sales Manager Franklin

A. Miller, and won the hearty support of the men in the field. This year, Grey-Rock's advertising is institutional in nature and is predicated on the theme: "Essential products for essential transportation."

Round-table discussions were held and ways and means to "keep the home tires turning" in time of war were offered by the men whose job is to keep 'em rolling.

New Wire and Cable Line

With America's armed forces requiring the great majority of critical

materials available in the production of wire and cable, the Merchandising Division of The Electric Auto-Lite Co. has announced a new streamlined line of replacement automotive wire and cable.

After a careful study of wartime needs of the automotive service industry, a line with fewer units, but still retaining a remarkably adequate selection, has been introduced.

Colorful new catalog sheets covering the new streamlined line have been prepared. The pages provide an easily understood method of telling what is now available and what discontinued models each item replaces.

Included in the wartime line are high-tension cable, battery cable, and ignition-cable sets. The Auto-Lite Steelductor Cable, now used on the majority of America's fighting planes, is likewise available in both the high-tension and ignition-cable set assortment.

Automotive Electric

Group Names Officers

At the manufacturers-distributors conference held at Chicago, Ill., Feb. 25-Mar. 2, the board of directors of the Automotive Electric Association re-elected all 1942 officers. These were:

President, J. A. Shank, service manager, Electric Auto-Lite Co., Toledo, Ohio.

Vice president, C. F. Conn, sales manager, Trico Products Corp., Buffalo, N. Y.

Vice president, Barry Cool, Electric Equipment Co., Los Angeles, Cal.

Secretary-treasurer, H. E. Josselyn, King-Seeley Corp., Ann Arbor, Mich.

Conn is chairman of the Manufacturing Division, while Cool is chairman of the Distribution Division.

In addition to the officers, the following are on the 1943 board of directors:

E. A. Dunlap, Auto Electric and Service Corp., Detroit; F. R. Hilson, Auto Electric Service Co., Ltd., Toronto, Canada; B. M. Leece, Leece-Neville Co., Cleveland; V. J. Lowenstein, Carter Carburetor Corp., St. Louis; A. G. Phelps, Delco-Remy Division, Anderson, Ind.; B. A. Spitzer, Spitzer Electrical Co., Denver; and Ben Wright, American Electric Ignition Co., Oklahoma City.

Sales Assistant

The Pennsylvania Rubber Co. announces the appointment of C. E. "Clem" Hannum as assistant sales manager, effective Feb. 1. Hannum has been with Cities Service Oil Co. (Del.) in various capacities at Tulsa and Chicago for the past 14 years. Prior to going with Pennsylvania Rubber, Hannum was Manager of tire, battery and Accessories sales for Cities Service.

CHECK THE FEATURES YOU WANT IN A WORKBENCH...

you'll find them all in...



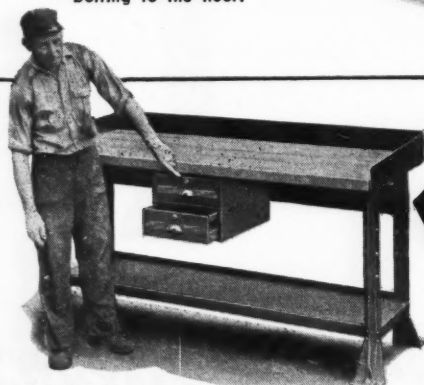
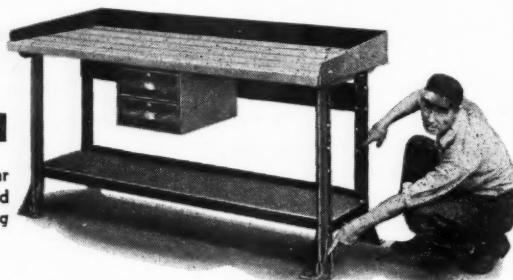
HALLOWELL
SHOP EQUIPMENT

RIGHT SIZE

"Hallowell" ready-made Work-Benches are made in five heights and widths and in seven standard lengths from 3 to 10 feet. Any number can be joined end to end for a continuous work-bench. 1367 combinations available.

**STURDY
CONSTRUCTION**

Constructed for long wear and made to stand firm and rigid without costly, time taking bolting to the floor.



CONVENIENCE

Pilfer-proof drawer units, shelves, cabinets, etc., are available to make the benches fit the job.

Prices and deliveries are right.

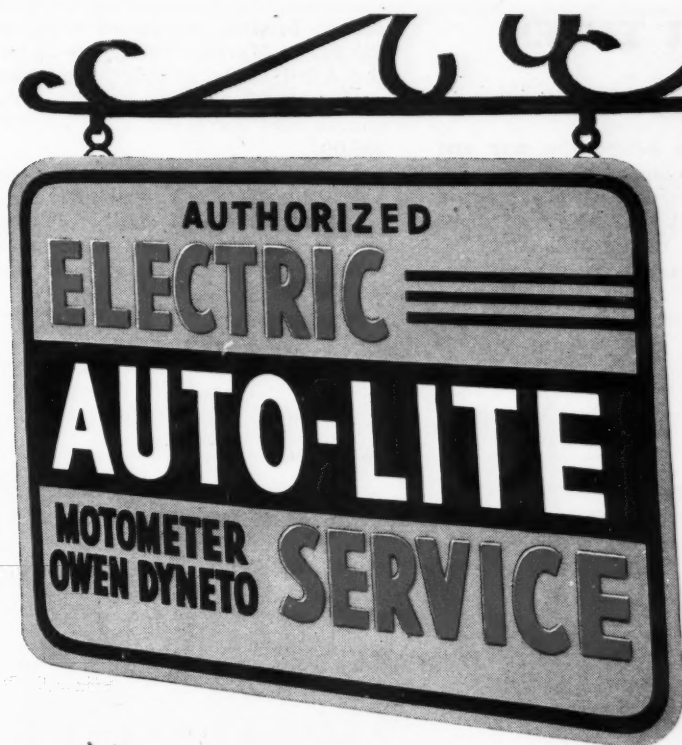
For full details get our
✓ Shop Equipment Catalog.

Pat'd and
Pat's Pending
Drawers are extra

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 561 BRANCHES: BOSTON · DETROIT · INDIANAPOLIS · CHICAGO · ST. LOUIS · SAN FRANCISCO

Today
this sign is
more valuable
than ever



Below is the graphic symbol of Auto-Lite's vital role in the automotive world today. Featured in Auto-Lite advertisements, it is helping send thousands of car owners to the Auto-Lite service shops in their neighborhood.



"My Auto-Lite Service Franchise, and the sign that goes with it, is more valuable today than ever," say members of Auto-Lite's world-wide service organization. They've discovered the happy combination of honest workmanship, and original factory parts has been a sound foundation on which to build a profitable and continuing business.

Auto-Lite's service policy benefits you in two ways. It assures you an adequate supply of Auto-Lite starting, lighting and ignition parts, within the limits imposed by Government restrictions. It also gives you a larger share of the service needed by the more than 8,500,000 cars, trucks and tractors in operation which are Auto-Lite equipped.

THE ELECTRIC AUTO-LITE COMPANY
TOLEDO, . Parts and Service Division . OHIO

AUTO-LITE

Starting
Lighting
Ignition

IN ITS 26 GREAT MANUFACTURING DIVISIONS, AUTO-LITE IS PRODUCING A LONG LIST OF ITEMS FOR AMERICA'S ARMED FORCES ON LAND, SEA AND IN THE AIR

APRIL, 1943

When writing to advertisers please mention Motor Age

75

WAR TIRES

(Continued from page 35)

new tires made before the war and the war tire made entirely of reclaimed rubber. Previously only owners having a monthly mileage of more than 560 could obtain such tires.

Further, owners with mileage between 560 and 1,000 monthly may now obtain Grade I tires. Previously this grade was reserved for owners having a monthly mileage of 1,000 or more.

April quotas of Grade I tires were

set at 540,000, compared with only 321,827 in March. For Grade II tires, the April quota is 540,000, compared with 253,000 in March. The truck quotas were increased to 360,000 from 299,000.

Holders of A books may still obtain recapping services without certificates, and are still eligible for used or recapped tires but must obtain ration certificates from their local boards.

All passenger-car tires that fit a 17-in. rim are added to the list of obsolete tires, which may be obtained by any owner with a mileage ration in excess of that provided by an A

book. Further, an A book holder who is occupationally qualified for a C book also is eligible for an obsolete tire.

Recap Discount Fixed

THE OPA has fixed a minimum discount of 20 per cent to dealers from maximum prices on retreading or recapping tires. Discounts of more than 20 per cent but not more than 35 per cent that were in effect to purchasers of the same class on Dec. 1, 1942, are established as minimum prices for those that allowed them. Discounts apply only to the recapping and retreading and not to the price of the carcass, and are f.o.b. the seller's place of business.

Recent Rulings

WAR CERTIFICATES. Effective March 1, commercial vehicles used exclusively for test purposes do not have to carry Certificates of War Necessity, the ODT has ruled. When being tested to meet Army and Navy standards and in training soldiers or sailors in maintenance procedures, they are exempt from the 35 m.p.h. wartime speed law but must carry the "V Emergency" pennant when driven at higher speeds.

WIRE. The WPB has ruled that distributors engaged solely in selling automobile replacement parts are not subject to Controlled Materials Plan Regulation No. 4, and may sell such items as bulk or spooled primary and spark-plug wire, battery cables and magnet wire for use as replacement parts, subject only to Order L-158 and other applicable WPB regulations and orders. L-158 limits the quantity and type of parts to be made.

AIR-COOLED ENGINES. Limitation Order L-254, issued March 4, by the WPB places production of air-cooled engines under strict control, but exempts those built for aircraft and motorcycles.

PD-1A FORMS. Revised forms are now available for shops seeking preference assistance in obtaining new equipment. The forms are simpler than those previously used and must be filed with the nearest WPB district office and not with Washington, as formerly. Applications for equipment costing less than \$100 will be handled entirely by the field offices.

WELDING. The WPB has forbidden the use of non-ferrous metal or stainless steel in many parts and portions of oxy-acetylene welding equipment. In addition, it forbids anyone from purchasing parts for such equipment if it increases his inventory beyond an amount equal to that used by him for repair purposes during the preceding.

(Continued on page 78)

Clean up

WITH HANSEN

ENGINE CLEANERS



Hansen engine cleaners are ideal for cleaning machinery or parts, spraying kerosene or other liquids on engines, machinery, etc. Flow of liquid is controlled by needle valve right at the operator's finger tips. Stem for connecting air line is furnished with each cleaner in 1/4", 3/8" and 1/2" sizes, also comes complete with six feet of metallic hose.

SAND-BLAST CLEANERS



Hansen sand blast cleaners are hard hitting cleaning units that remove paint, rust, carbon, also clean parts for welding and soldering. An unusual and efficient unit that holds three pounds of silica sand and operates very efficiently from 125 pounds air pressure. Furnished with 1/4" hose stem for air line connection.

Send for free catalog!

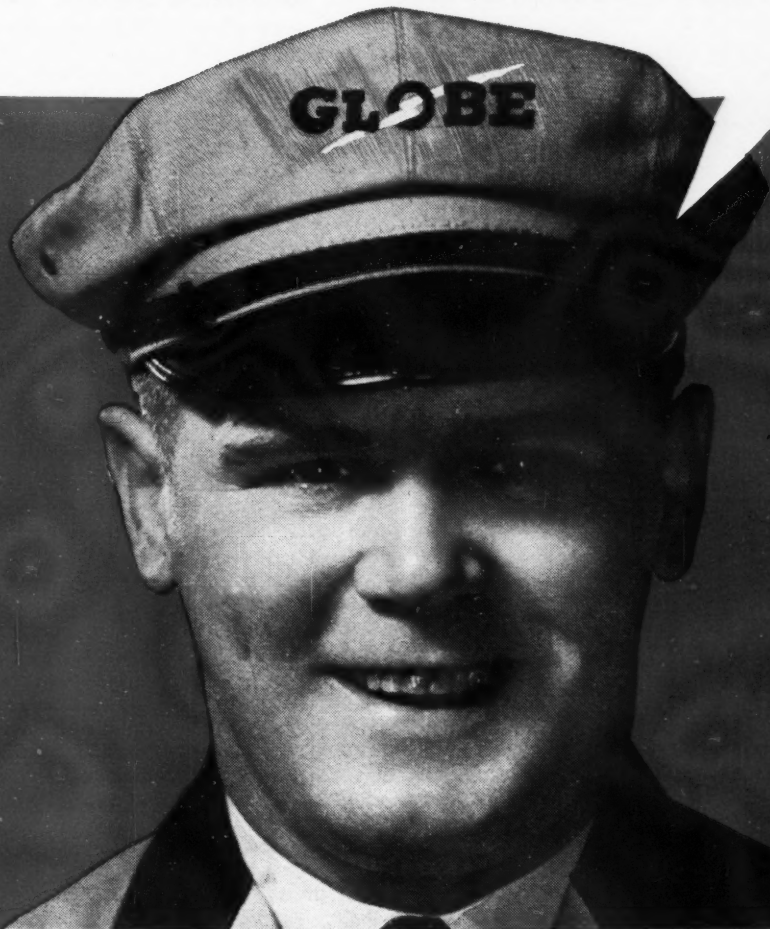
Hansen

MFG. CO.

INDUSTRIAL Air Line EQUIPMENT

1786 EAST 27TH STREET • • • CLEVELAND, OHIO

"My Business Today is *Preventing* **BATTERY BLACKOUT**"



"With gas rationing, many of my customers are NOT driving enough miles to keep their car batteries charged. Battery Blackout hits them without warning."

You can help your customers prevent the inconvenience of Battery Blackout. Let them know the necessity of . . .

FIRST — regular inspection of charging rate, water level, condition of terminals, cables and battery cells.

SECOND — more frequent recharging to maintain efficient power for split-second starting and safe lights.

THIRD — replacement...with the battery built especially for wartime replacement service...
GLOBE SPINNING POWER.

See Your Globe Battery Jobber now.

GLOBE-UNION INC.
MILWAUKEE, WISCONSIN



MA-443

RECENT RULINGS

(Continued from Page 76)

ing two calendar months. Further, no one is permitted to buy any apparatus as a spare or stand-by if the purchase extends his stock beyond one piece of spare apparatus for each ten pieces of like apparatus in operation.

* * *

BATTERIES. Farmers may now purchase new or rebuilt automobile batteries to use with shocking devices for wire fences and with other farm equipment, the WPB has ruled. The

Production Equipment Division of the Department of Agriculture estimates that 765,000 batteries are needed immediately by farmers.

* * *

NEW CARS. To insure that the remaining pool of passenger cars, trucks, and trailers will be ready for use when needed, the WPB has forbidden the stripping of new vehicles to obtain replacement parts. Conservation Order M-216-B prohibits the removal from a new passenger car of any standard equipment or other part, the removal of which will impair the operating efficiency of the vehicle un-

less compliance is made with OPA Ration Order 2B. Removal of equipment or parts from a commercial car is forbidden.

Two exceptions are that batteries may be removed, provided that new units of equal quality and capacity are installed in the vehicles on delivery to customers, and that tires, casings, and tubes may be removed for storage or in exchange for similar equipment but only upon compliance with OPA Ration Order 1-A. The order further prohibits the conversion of any reserve new passenger car to any other model or type unless compliance is first made with Order 2B.

* * *

NEW TRUCKS. Only 57,573 trucks, trailers, and third-axle attachments remain the reserve pool of commercial vehicles on March 10, the WPB announces. The vehicles are in the hands of 14,000 manufacturers, their branches, and distributors and dealers in American territory.

* * *

C RATIONS. Radio broadcasting engineers and technicians have been made eligible for C gasoline rations necessary to transport heavy equipment to and from temporary broadcasting facilities.

* * *

ANTI-FREEZE. The WPB has forbidden the production and sale of eight additional brands of anti-freeze solutions. According to the order, the additional brands were tested by the Bureau of Standards and found to be deleterious. They bring total number of brands forbidden to 22.

* * *

CAR POOLS. Rules governing car sharing, as a claim to supplemental gasoline rations, have been changed by the OPA. Applications henceforth will be denied in metropolitan areas, regardless of car-sharing arrangements, if the applicant's locality is adequately served by subway, elevated, or railroad commutation service.

* * *

FLEET RATIONS. Fleet operators seeking renewal of fleet or official rations, the OPA has now ruled, may submit a certificate showing that tire inspections have been made, provided that undue hardship would be involved in submitting individual records for every vehicle.

* * *

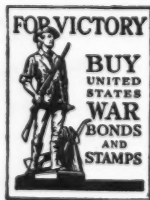
TRACTOR TIRES. Farm tractor and implement tires will be recapped hereafter only with a material made almost entirely of reclaimed rubber, and replacements will not be issued for tires that are recappable, the OPA announced last month.

* * *

NEW CARS. The new-car quota for April has been set at 38,000 new vehicles, compared with 37,100 in March. April state, regional, and national reserves total 5600, compared with 4825 for March.



WAR materials! There must be no delays in getting them to the fighting fronts. Many lives might be lost just because some small part failed.



Don't take chances! When making ignition parts replacements, play safe. Use "Blue Streak," the time-tested line known the world over for its "long-life peak performance." Built with that extra margin of wear-resistance that assures dependable service.

For the sake of human lives—and your own reputation—replace with "Blue Streak."



STANDARD MOTOR PRODUCTS, INC.

37-32 Northern Blvd., Long Island City, N. Y.

"The ABILITY to serve well is as important as the WILL to do so."

TEAMWORK *Counts!*



Working together . . . that's the pay-off today!

Raybestos dealers are in there getting business because Raybestos is in there working with them to help maintain their volume and profit.

Raybestos dealers are teamed up with a brake lining that:

- 1) is exactly right for today's service
- 2) protects car owner good-will by maintaining its highest quality
- 3) enjoys universal car owner acceptance
- 4) is available in ample quantities
- 5) reaches dealers by fastest deliveries

Teamwork counts when you are teamed up with Raybestos.

THE RAYBESTOS DIVISION of Raybestos-Manhattan, Inc., BRIDGEPORT, CONN.

Raybestos

AMERICA'S
BIGGEST SELLING

BRAKE LINING

YOUR 2
BEST FRIENDS
for
HIGHWAY
SAFETY



BRAKE LINING, CLUTCH FACINGS, FAN BELTS, HOSE • FOR CARS, TRUCKS, BUSES, TRACTORS • ON THE WAR AND CIVILIAN FRONTS

only 22 miles southeast of Kharkov, the commune said.

HUMOR IN ADS HITS NEW HIGH

"Mountain Boys" Star as Spark Plug Salesmen

Auto-Lite's hilarious "Mountain Boys" campaign using Paul Webb's cartoon side-splitters is going into more magazines and farm papers than ever. Publications now used include Saturday Evening Post, Time, American, Liberty, Collier's, Look, Popular Mechanics, Popular Science, Esquire, Farm Journal, Wisconsin Farmer, The Farmer, Nebraska Farmer, Farmer Stockman, Dakota Farmer, Prairie Farmer, Wallaces' Farmer, Progressive Farmer.

Humor Gets Smiles and Sales

When millions on millions look, laugh and listen, dealers get action . . . like 60,000 dimes for the U.S.O. that accompanied names and addresses of men in service who were mailed a big "Mountain Boys" Cartoon Book. The "Mountain Boys" see to it that everyone, car owners, soldier boys, and dealers have a barrel of fun and a mint of action for their money.

Auto-Lite's "Plug-Chek" FREE

Wherever the "Mountain Boys" go—and they sure do get around — they're talking and selling "Plug - Chek." Dealers everywhere can find out why "Plug-Chek" is getting such an enthusiastic reception from car owners seeking to stretch gas rations. Auto-Lite offers to send a "Plug-Chek" Indicator and Data Book FREE. Just write on your letterhead to Merchandising Division, The Electric Auto-Lite Company, Toledo, Ohio.

The address is expected to last nearly an hour.

AUTO-LITE SPARK PLUGS

IN SERVICE AT HOME AND ON EVERY FRONT



"Hold 'er, Luke . . . she's spittin' whiskers!"

SPARK PLUGS CAN WASTE GAS AT MACHINE-GUN SPEED . . .

Faulty spark plugs can waste gasoline at machine-gun speed . . . even with 35 mile-an-hour Victory driving.

Here's an easy way to tell if your engine is "spark-weary" . . . wasting gas. Ask your Auto-Lite Dealer for "Plug-Chek" Inspection Service.

Actual tests by the American Automobile Association show this new spark plug inspection service can help car owners get as much as 12% increase in gasoline mileage.

Have your nearest Auto-Lite Spark Plug Dealer give your car "Plug-Chek" Service today.

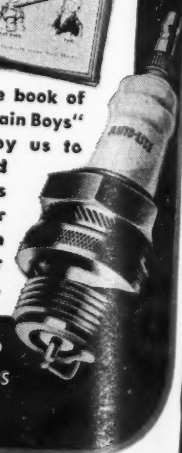
THE ELECTRIC AUTO-LITE COMPANY
Merchandising Division
TOLEDO, OHIO SARNIA, ONTARIO

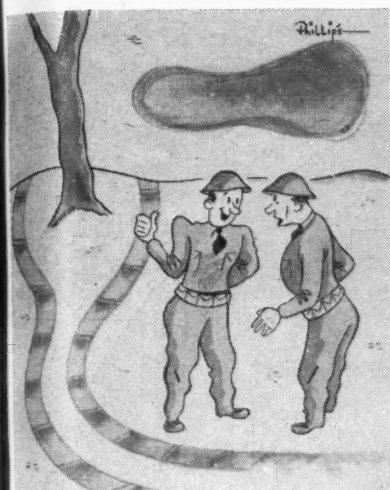
Keep
'em
smiling
and help
the USO



A big, new 24-page book of Paul Webb's "Mountain Boys" cartoons mailed by us to men in Service. Send name and address with dime or War Savings Stamp which we will turn over to the USO in full.

IGNITION ENGINEERED
BY IGNITION ENGINEERS





"Boy, did my last grenade" rattle that Sarge!"

Vice Presidents Named

W. H. Dingley, president of the Automotive Booster Clubs, has announced the appointment of regional vice presidents for the year. The appointments follow:

Rocky Mountain and Pacific Northwest Division. A. Ralph Cooper, Denver.

Dixie Division, Larry Kidd, Atlanta, Ga.

Central Northwest Division, A. C. Martin, Minneapolis, Minn.

Central Great Lakes Division, A. W. Hoffman, Cleveland Heights, Ohio.

Southern Great Lakes Division, Carl L. Broich, Indianapolis, Ind.

New England Division, Silvio Amoroso, East Milton, Mass.

Eastern Great Lakes Division, Walter T. Mead, Buffalo, N. Y.

Eastern Seaboard Division, Philip Gauvreau, Pelham, N. Y.

Pacific Southwest Division, Ray E. Latham, Los Angeles, Cal.

General Plains Division, H. B. Barrett, St. Louis, Mo.

Western Great Lakes Division, C. W. Swander, Chicago, Ill.

Southern Plains Division, Ben B. Burk, Dallas, Tex.

Canadian Division, L. M. Frigon, Outremont, Que.

Weather Forecasting

"A Start in Meteorology" by Armand N. Spitz was written for the layman and ought to find wide interest among those who are, or hope to be, amateur weather prophets.

The book is so simply written that it requires no special training on the part of the reader to grasp its explanation of everyday weather phenomena, and to make progress in the difficult art of making accurate weather forecasts. Questions on the points covered follow each chapter so

that the book may be used as a textbook. Answers also are supplied. The illustrations unfortunately lack the clarity of the text.

"A Start in Meteorology" is published by the Norman W. Hanley Publishing Co., New York. The price is \$1.50.

War Show for Plant

The Army and Navy took over the Kellogg Switchboard and Supply Co. plant, but only for one day. Through a program arranged and supervised by the War and Navy departments,

production workers saw a memorable "show" consisting of demonstrations of various types of communication equipment, war movies, and the experiences of several soldiers, now back from the fighting fronts.

Walkie-talkies were demonstrated by a staff of ten Army and Navy personnel, as well as demonstrations of portable telephones, hand microphones and handie-talkies. Such instruments are being used by American soldiers on all fighting fronts and, in most instances, are being manufactured wholly or in part at Kellogg's great Clearing District plant.

THIS SIMPLE 3-POINT PLAN Helps BEARINGS Stay Young!

HERE'S the quickest, most practical, lowest cost way for Auto and Truck Service Men to build good will among their customers: the famous Ahlberg 3-Point Plan for Keeping Ball and Roller Bearings Young.

- 1. POWER WASHING**—not a casual "dunking" in a solvent, but a thorough cleansing that removes every trace of old lubricant and dirt.
- 2. PRESSURE AIR DRYING**—makes certain that every part is perfectly clean—and dry.
- 3. PRESSURE PACKED** with Clean Grease—fresh lubricant forced into every part of the bearing.

Your Ahlberg jobber can supply this modern Croft equipment that is saving time, labor and money for thousands of wide-awake service shops. Don't fail to find out about this practical plan.

SAVE WORN BEARINGS

Every worn bearing is the finest raw material for a reconditioned bearing. Whenever a bearing needs replacement, have it re-ground the Ahlberg way. Ahlberg Ground Bearings are carefully re-conditioned to new bearing standards and are guaranteed to give "new bearing" performance. For more than 35 years many big fleets have been using them as standard replacement bearings. Write Ahlberg for the new AGB Book of particulars.

1 2 3

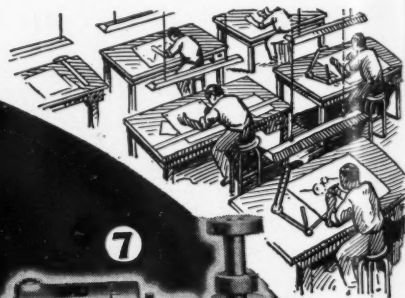
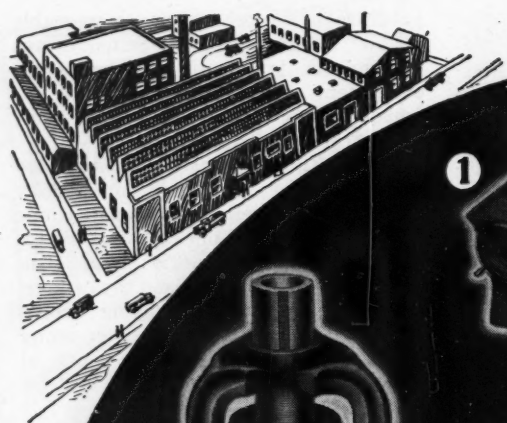
AHLBERG

BEARING COMPANY

Manufacturers of CJB Master Ball Bearings

★ 3028 WEST 47th STREET • CHICAGO, ILL. ★

Out West via PRECISION BEARINGS, INC. Los Angeles



1. Model 80 Wet Type Valve Refacer
2. Ring Ridge Reamer
3. Model EJ ECCENTRIC Valve Seat Grinder
4. Hydraulic Brake Hones
5. Piston Pin Hole Hones
6. Model H Cylinder Hone
7. Valve Seat Inserters; made in power and hand operated models.

NEW IDEAS IN HALL TOOLS AND EQUIPMENT ARE COMING!

What's YOUR Idea?

If you have an idea for tools, equipment or appliances, let us develop and market it for you. Write us today in strict confidence.

There has never been anything finer than HALL tools and equipment and we intend there never shall be. Though our plant facilities have been increased again and again, and are operating day and night producing HALL precision equipment for war use, we're looking ahead. RIGHT NOW new and enlarged laboratory and engineering facilities are devoted exclusively to the development of new ideas in tools and equipment which will go into production the very day Victory is won. Watch HALL when it's over Over There!

THE HALL MANUFACTURING COMPANY, TOLEDO, OHIO

HALL

MANPOWER

(Continued from page 40)

structed shop foreman in the best ways of training mechanics, but it has taught no actual skills.

One of the biggest problems confronting any proposed mechanic-training program is the dearth of trainees. Youths are no sooner trained than they are called for the draft, most older men are already employed, and even women have shown a marked willingness to leave an automobile shop for a war plant as soon as they have been trained.

The interest being taken in motor transportation is further demonstrated by the recent War Manpower Commission order to U. S. Employment Offices not to attempt to transfer truck drivers and maintenance mechanics employed by distributors of fuel oil and solid fuels to war industries or other essential jobs. Although all automotive mechanics have been listed as essential, no such protection for most of them has been provided by the manpower commission.

The Office of Civilian Supply also has stepped into the manpower situation by undertaking a survey of service establishments, including automobile repair shops, in Connecticut. The cities of Bridgeport, Hartford, Waterbury, and New Britain will be covered. Designed to determine the needs in these critical areas as to both manpower and materials, the survey will be expanded later to cover all centers where shortages are acute.

DRAFT APPEALS

ALTHOUGH the Selective Service Act permits an appeal to the President when the local and state draft boards fail to grant deferment sought by employers, there are several things that must first be done, says the American Automobile Association in a bulletin to its affiliated repair shops. The correct procedure includes 10 definite steps:

1. Employer must make claim on Form 42A, filing it with local board under the name of the man whose deferment is sought.
2. Employer should prepare Form 42A carefully to give detailed and specific information on registrant's qualifications.
3. Employer may submit additional information in letter, as evidence which he believes will aid board in making decision.
4. Form 42A should be filed for all single men with collateral dependents and for married men with wives and no other dependents. Form 42B should be filed for men with wives and children.
5. Filing Form 42A provides employer with right to appeal to Appeal Board prior to the time the registrant is placed in Class 1-A. Board will

send employer Form 59, which is notice of right to appeal.

6. Employer returns Form 59, or writes letter to board, stating his desire to take an appeal. Appeal must be taken within 10 days after notice of classification has been mailed registrant.

7. If Board of Appeals sustains local board, employer may then ask State Director to review the case.

8. State Director may direct the reopening of the case or he may appeal to the President.

9. If State Director takes no further action, employer may ask national

Director of Selective Service to review case.

10. Only after all above appeals have been tried should appeal be made to the President.

Made Sales Head

The R. M. Hollingshead Corp. of Camden, N. J., announces the appointment of J. W. Klapp as sales manager of the Whiz Household Division. N. T. Corson now becomes general manager of the All-Nu Products Division. Klapp, who just recently joined the Corporation, has had long experience in the sales.



**STEP UP
FIRING
POWER**

**WITH
NIEHOFF
APPROVED**

QUALITY Coils

Loaded with power for quick, positive starting in all temperatures, NIEHOFF COILS give unrivalled electrical performance with minimum battery drain. Ample reserve capacity assures smoother acceleration and better gas mileage.

Complete stocks of approved quality coils, to service all trucks and buses on the road are strategically located in a National network of NIEHOFF Jobbers.

Every necessary replacement with a Niehoff Coil will help to maintain our vital and efficient automotive transportation system so essential to the needs of our country.

Ask your Jobber's salesman NOW.

C. E. NIEHOFF & CO.
4925 Lawrence Ave. Chicago, Illinois
Branch: 1340 S. Flower St., Los Angeles, Calif.

NIEHOFF

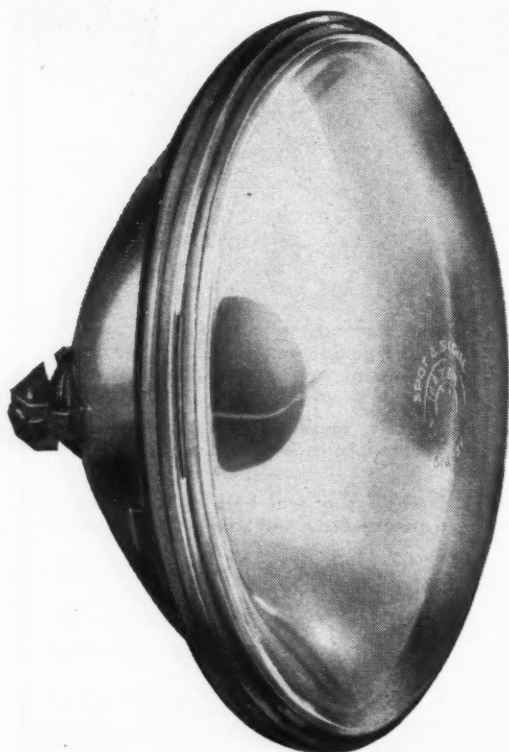
**TAKE OFF
with
NIEHOFF
TODAY**

"THROW YOUR SCRAP INTO THE FIGHT"

To help the U. S. Army



**G-E MAZDA "ALL-GLASS"
SEALED BEAM SERVICE HEADLAMP**



**G-E MAZDA "ALL-GLASS"
SPOT AND SIGNAL LAMP**

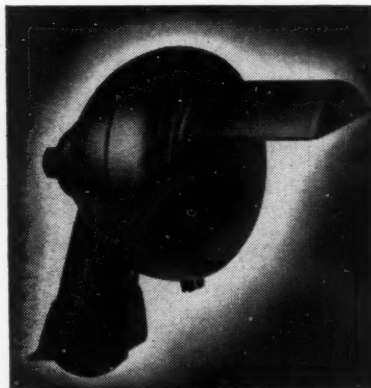
AN amazing variety of motorized equipment helps the U. S. Army get there first with men and munitions. Tanks, armored cars, scout cars, howitzer and gun carriers, Bren-gun carriers, ammunition carriers, cargo carriers, tractors, trailers, and trucks—all are essential to modern warfare!

General Electric is making all types of lamps for Army vehicles. Some are automotive lamps that had proved their worth in peacetime—others are special developments of G-E war time research.

Among the leaders are G-E MAZDA "All-Glass" Sealed Beam lamps. They have greater power and endurance. They are hermetically sealed to exclude dirt, dust, and moisture. These qualities are of great importance to the Army—not only in service head lamps, but also in Spot and Signal lamps which incorporate the same principles.

It takes more than 70 different types and sizes of G-E MAZDA lamps to help keep Army vehicles rolling. All of them are being made to the same high standards of quality that have always been characteristic of G-E MAZDA lamps.

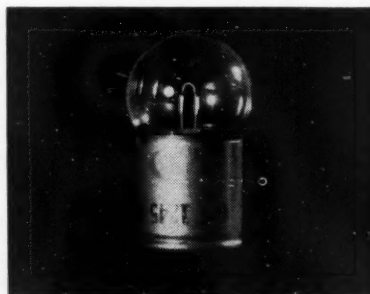
BLACKOUT LAMPS FOR ARMY VEHICLES



This special blackout housing encloses G-E MAZDA headlamp shown at right (G-E makes only the lamp, not the housing). Similar housings are used with other G-E blackout vehicle lamps.



Use of this lamp in special blackout housing (left) provides maximum visibility consistent with obscurity requirements. Beam is accurately shielded and directed. Developed especially for Army.



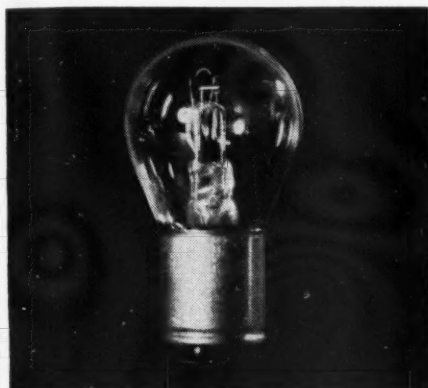
In a special blackout housing, this small and compact G-E MAZDA lamp is used by the Army as a tail and stop marker on military vehicles other than tanks.



Tail and stop marker for tanks (in a special blackout housing). Has two filaments in series for greater strength. Also used as instrument illuminator in tanks.

get there *first!*

THESE ARE A FEW OF THE MANY
G-E MAZDA LAMPS THAT HELP KEEP
MILITARY VEHICLES ROLLING . . .



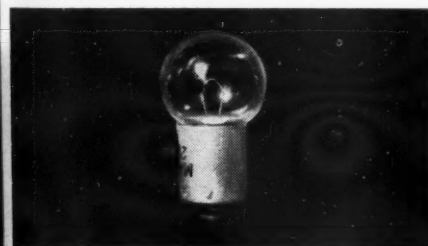
General service stop and tail bulb for all vehicles except tanks. Used when there's no worry about aerial observation.



General service stop and tail bulb for tanks. Has coiled-coil filament for maximum light concentration. Rugged.



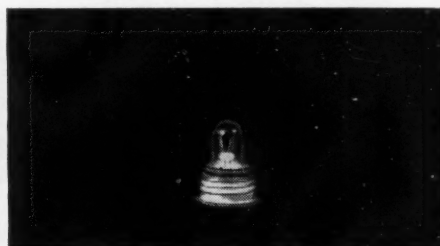
This is the bulb used in tank headlamps. Gives a powerful beam of light for easy maneuverability. Coiled-coil filament.



Instrument illuminator for vehicles other than tanks and jeeps. Tanks use bulb shown lower right, opposite page.



Jeeps use this smaller bulb for instrument illumination. Helps driver read temperature, pressure and other gauges.



Compass illuminator on cargo carriers. Meets need for small, compact source of light. Adjustable volume of light.



Tank inspection lamp. Used on extension cord inside tank to locate trouble and make repairs.

... AND ON THE HOME FRONT—

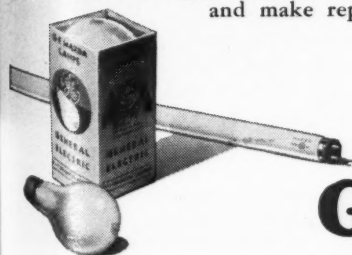
Keep war workers' cars rolling by giving them the best possible light for essential night driving! Besides replacing burned out bulbs, you can:

1. Clean reflectors and lenses on pre-1940 cars. Dirt can steal as much as half the light.
2. Aim headlights to direct maximum light on the road and minimize glare.

See your G-E MAZDA lamp supplier for details.

G-E MAZDA LAMPS

GENERAL  ELECTRIC



WHISPERS

(Continued from Page 35)

issue special orders in the field to take care of special needs. The result is that the WPB man can help you get the part and the ODT man cannot without going through the WPB office. Many shop operators are shortcutting the extra step and going direct to WPB. One tip—Do not approach the WPB man unless you have the part accurately identified and have tried all your normal sources of supply without success.

★SERVICE COMMITTEES

It is scarcely news that all ODT offices have been requested to organize industry committees to act with the maintenance specialist in each office. These committees are to have car dealer and independent garage operator representation. This is not the whole story.

Once the committees are organized, the committee representative from each branch of the automotive industry will be asked to organize a subcommittee of men from his branch to enable him to represent a cross

section of that branch. If you are tapped for membership on the subcommittee, it would be wise to accept or cooperate in any way you can with the group, since the committee reports will go through the filter in Washington and give policy makers an accurate report of conditions as they are reported by men actually in industry.

★PARTS MANUFACTURE

So thin was the trickle of material from which to make automotive parts for some time that some parts makers quit the business and tooled up to make other war necessities for which they could get raw material in more certain quantities. Now with the controlled Materials Plan in effect and ODT as a claiming agent getting a more generous portion of the stockpile, it has in some cases at least become a problem of finding a manufacturer to use the material earmarked for automotive parts production. Parts makers are coy about retooling again to get back in the parts business.

OIL DELIVERIES

(Continued from Page 21)

tary requirements already necessitate severe restriction of civilian consumption and these requirements are almost certain to become more urgent. The possibility exists, it is explained, that shortages in the East may be as critical next winter as they were last.

For reasons of security, it is not possible to reveal the amount of petroleum products going to our armed forces and being shipped under Lend-Lease commitments, but the chart does disclose the fact that shipments of oil are tremendous. Daily consumption in the East before the war was estimated at 1,200,000 barrels. Estimated deliveries last month were virtually equal to this consumption. Every drop of gasoline and fuel oil saved by the drastic rationing in the East, it must be assumed, is going direct to our own fighting forces and those of our allies.

Too little gasoline is being reserved for anything approaching normal civilian driving, but enough is going abroad to throw any Axis drive into reverse.

Takes New Plant

More spacious quarters provided by the new home at 3524 West Belmont Ave., Chicago, Ill., enable United Precision Products Co., to take full advantage of its rapid expansion, for production. The present location of United Precision marks the company's third removal in the last five years. Increasing business outgrew the manufacturing requirements in each instance.



Photo courtesy War Dept.

OUR ARMY'S MIGHT RIDES ON COMPRESSED AIR

An army may march on its stomach, but its might rides on compressed air. Heavy artillery, tank busters, jeeps and troop carriers . . . yes, the greater percentage of our army's vehicles are equipped with pneumatic tires. Therefore, tire care is an important part of military operations. To maintain greatest mobility, correct tire pressures must be maintained . . . flat tires must be prevented.

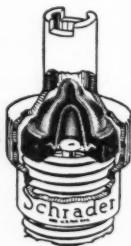
Schrader Tire Valve Caps play an important part in the battle against compressed air losses. Every day they are proving their ability to "take it" in the toughest kind of service—in desert heat—in tropic mud—in arctic cold. No dirt can enter . . . no air can escape through the valve fitted with an air-sealing valve cap.

Do your part to keep defense and essential civilian transportation rolling. Inflate tires accurately and seal all valves with Standard Air-tight Caps.

All Standard Schrader Valve Caps are built with this doubly-rein-



forced sealing unit and are guaranteed air-tight up to 250 lbs. pressure.



Schrader
VALVE CAPS
HELP SAVE RUBBER

A. SCHRADER'S SON, Division of Scovill Manufacturing Company, Incorporated, BROOKLYN, N. Y.



for Rundown Electrical Systems **KESTER** **ROSIN-CORE SOLDER!**

● Spring tune-ups this year will mean more than ever before; electrical systems, especially, will need expert attention.

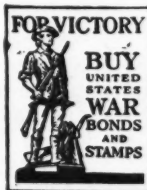
● Where wiring is concerned, Kester Rosin-Core Solder is your No. One Helper. It protects connections *permanently* for the life of the car, does away with short-circuits and resistance from corroded terminals.

● That's because the patented plastic rosin flux doesn't injure insulation or start corrosion. Kester alloy *holds tight*; resists bending, vibration, shock, contraction and expansion.

● Kester Rosin-Core Solder does faster, surer work; use it for all electrical soldering jobs! Order from your jobber.

KESTER SOLDER COMPANY
4242 Wrightwood Avenue, Chicago, Illinois

Eastern Plant: Newark, N. J.
Canadian Plant: Brantford, Ont.



KESTER

Cored Solders

FOR EVERY AUTOMOTIVE USE

THINK TWICE BEFORE REPLACING WIRE OR CABLE



Think *twice* before putting in a new wire or cable. Don't make a replacement when a repair will do.

Under order L-158, new automotive wire and cable is reserved for *essential* jobs exclusively. If a wire or cable can be cleaned, shortened, or otherwise repaired, rather than replaced, that is what must be done.

There's no two-way business about it. Copper is short. So are rubber and lacquer. The Armed Forces could easily use all the supplies available. It's only because cars, trucks and buses are considered essential, too, that limited quantities of new wire and cable are made available at all.

But the supply must be conserved. Check the wire on every job that comes into the shop—and make *repairs* before replacements become necessary! Here's another hint—keep wire clean. Wiping off accumulated dirt and grease will do wonders toward increasing the life of present wiring.

**THINK TWICE
BEFORE USING MATERIALS
NEEDED BY THE ARMED FORCES**



✓ Check the wire on every job...

"Every dime and dollar not vitally needed for absolute necessities should go into WAR BONDS and STAMPS to add to the striking power of our armed forces."

—President Roosevelt

EVERYBODY
EVERY PAYDAY

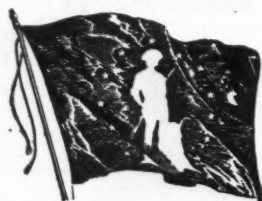
10%

IN WAR BONDS

★ ★ ★ ★ ★ ★ ★ ★

New Goal for Payroll Savings Plan!

Along with increased war production goals go increased costs : : : extra billions which must be raised, and raised fast, to win this war. That means we must raise our sights all along the line, with every firm offering every American with a regular income the chance to buy more *War Bonds*. YOUR help is asked in encouraging employees to put at least 10 percent of their pay into War Bonds every payday, through the Payroll Savings Plan. For details of the Plan, approved by organized labor, write, wire, or phone Treasury Department, Section T, 709 12th St. N. W., Washington, D. C.



U.S. WAR SAVINGS BONDS

LEONARD
SPARK PLUG — ITS

Air Cooled
PATENTED

A "PLUG" for CONSERVATION!

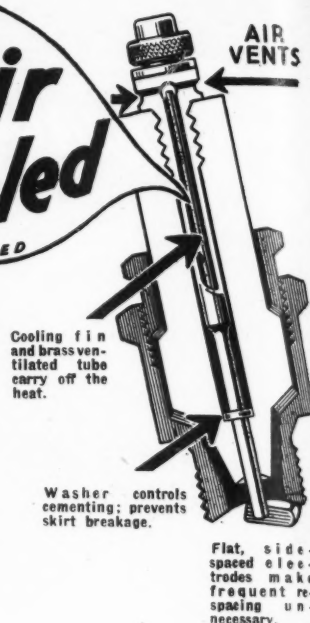
THE AIR COOLED center electrode dissipates more heat, and does it faster, enabling LEONARDS to out-perform and out-last the ordinary spark plug.

Leonard GAP CONTROL (flat, SIDE-SPACED electrodes) eliminates frequent re-gapping and prevents power loss.

FOR LONGER AND BETTER SERVICE INSTALL LEONARDS

Send jobber's name if he can't supply you.

LEONARD SPARK PLUG CO., NEWARK, N. J.



Wm. J. O'Neil Resigns as Dodge President

William J. O'Neil has resigned as president of the Dodge Division and general manager of the new Dodge-Chicago plant of Chrysler Corp. He had been with Chrysler and its predecessor, the Maxwell Motor Co., since 1921. Herman L. Weckler, vice-president and general manager of Chrysler Corp., will assume the duties of the Dodge presidency, while L. L. Colbert, formerly operating manager, has been appointed general manager of the Dodge-Chicago plant. Fred J. Lamborn, formerly vice president in charge of manufacturing, has been named vice president and general manager of the Dodge Division.

Victory Service League Plans 1943 Expansion

Plans for expanded and intensive activity during 1943 of the Victory Service League, national patriotic alliance of car and truck owners, sponsored by the Chevrolet dealers of America, were formulated at a two-day session of the League's National Dealer Council composed of sixteen dealers from all over the country, held in Detroit, Feb. 25 and 26.

Membership in the league, it was reported, is now nearing the million mark. Endorsed by prominent citizens and civic leaders all over the country, including the governors of virtually all the states, presidents of most of the country's colleges and universities, senators, congressmen, professional people, clubs and frater-

nal organizations, the League during the coming months will take an even more vital part, it is said, in war efforts on the home front than the important contributions it has made in the past to such essential undertakings as the sale of war bonds, collection of metal and rubber scrap and furnishing books and sports equipment to the men in the armed forces.

Named Sales Chief

C. O. Kleinsmith, for the last two years manager of the Eastern Division of National Carbon Co., Inc., has been appointed general sales manager of the "Eveready" Division of the company, it is announced by J. M. Spangler, Vice President in charge of sales.

Kleinsmith joined National Carbon Co., manufacturer of "Eveready" flashlights and batteries and "Pres-tone" anti-freeze, in 1919.

Floyd W. Berdan, formerly assistant manager of the Eastern Division, has been made division manager to succeed Kleinsmith.

NSPA Membership at Peak

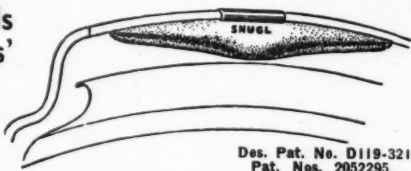
Recent additions to the rapidly growing roster of the National Standard Parts Association bring the total membership of that organization to the highest figure in its history, according to Frank McKenzie, chairman of the membership committee.

All previous records for new memberships were broken by the association last year when 135 wholesalers and manufacturers were admitted.

RE-CAPS OR NEW, TIRES ARE PRECIOUS

Balance the wheels
on your customers'
cars with

Snugl



Des. Pat. No. D119-321
Pat. Nos. 2052295
2036737

Fade-away BALANCE WEIGHTS

THE WEIGHTS THE GOVERNMENT USES

and get many more miles from their tires. Snugls are the weights with the dove-tail clip that cannot rattle or work loose. Easy to install. Sizes 1/2 oz. to 1 1/2 lbs. Ask your Jobber or write us direct for full details.

Manufactured by

MID-WESTERN AUTO PARTS, 824 E. Elm St., Kokomo, Ind.

Western Distributor: Kenneth V. Mills, 910 W. Pico Blvd., Los Angeles, Cal.

MOTOR HEADQUARTERS

IN NEW YORK

1 block from Automobile Row,
this modern 700 room hotel is
a favorite stopping place for
members of your industry.

Single \$2.50

Double \$3.50

**Hotel
WELLINGTON**

7th Avenue at 55th Street
A Knott Hotel



RBC ROLLER BEARINGS

help Transport Men and Materiel

*over the
Road*

**ROLLER BEARING
COMPANY
of AMERICA**

26 Whitehead Road TRENTON, N. J.

MOTOR AGE

—is a publication keyed directly
to the needs of the maintenance
field. Built on the requirements
of the serviceman. Edited by Bill
Toboldt. Read it every month.

A Chilton Publication

CHESTNUT AND 56TH STS.
PHILADELPHIA, PA.

New "TOE-IN" Measuring Gauge

Only
10 Inches Long

Every Mechanic
Should
Own One!



**Easier
to Use!**

Fits In
Tool Kit

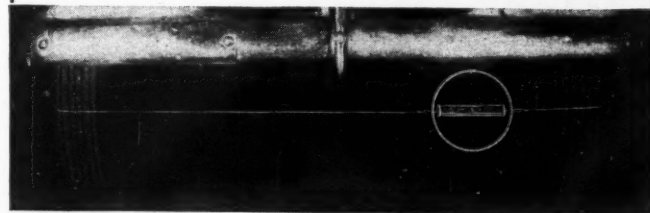
The Micro-Linor Toe-in Measuring Gauge requires only one man to operate it. Just attach the grippers to the rims and take front readings. Then roll vehicle forward and take rear reading. All done in less than 2 minutes. Extremely accurate—because gauge is held in same spot for both readings. Fits any vehicle—even airplanes. Light, compact and durable. Only 10 inches long. Takes up little space in tool kit. Packed in wooden case. Every mechanic should own one. Write today for circular.

TESTING APPARATUS, INC.

1623 W. Fort

Detroit, Mich.

**SEND for
Complete
Information**



Mr. Parts Jobber:
DO YOU KNOW
That NOW-More Than Ever Before
IT PAYS TO LINE UP WITH LION!



**Keep'em Rolling
for
VICTORY**

LION AUTO PARTS & MFG. CO., INC.

1920 S. Michigan Ave. 2214 20 Main St. 1239 Osborne St.
CHICAGO DALLAS MONTREAL

Keep 'em Rolling



WITTEK Noc-OUT HOSE CLAMPS



The standard of the industry. Quick-tightening, perfect leak-proof hose connections, for original equipment and replacement. For Radiator, Heater, Booster Brakes and High Pressure hose connections. Wittek Manufacturing Co., 4305-15 W. 24th Place, Chicago, Ill.

WITTEK **Noc-OUT**
HOSE CLAMPS



★ While Aro's production facilities are helping to "Keep 'em Flying" Aro users "Keep 'em Rolling"—with a freedom from service interruptions that confirms their judgment in choosing Aro quality.

THE ARO EQUIPMENT CORP., BRYAN, O.

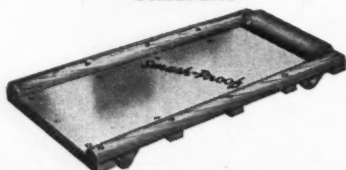
Since 1897

UNITED STATES ELECTRICAL TOOLS

have never swerved from their original standards of **QUALITY AND SERVICE.**

**THE UNITED STATES
ELECTRICAL TOOL CO.**
CINCINNATI, OHIO

Smash-Proof CREEPERS



Contain a minimum of scarce materials needed in the war effort.

HULBERT CREEPER CO.
ASHTABULA, OHIO

Named Production Chief

The board of directors of Wilkening Manufacturing Co., maker of Pedrick piston rings, announces the election of Sydney P. Lyon as vice-president in charge of production.

Lyon brings to the Wilkening organization a wealth of experience and a country-wide reputation for efficient, high-speed production, especially of precision parts for aircraft. He comes to Wilkening from the position of General Manager of Kellett Autogiro Corp., Philadelphia.

Lyon will be in charge of all production of Pedrick piston rings for both war and civilian requirements at the Wilkening factories in Philadelphia, Pa., and Scranton, Pa.

Painting Classes

The conservation of the nation's war transportation system will be the keynote of the first half 1943 schedule of the DeVilbiss Training School for car, truck, and bus painters announced by The DeVilbiss Co., Toledo, Ohio.

The first session started on March 8, and others will start April 5, May 3, and June 7, to continue for one week periods. Classes are open to all users of DeVilbiss spray painting equipment. There's no tuition fee—no obligation on the part of the individual or the firm represented.

The training course will include class and shop instruction in the use and care of equipment and other phases of shop painting practices.

Catalogs Smaller

W. H. Boney, manager of the MEWA Catalog Department, recently released a breakdown of progress that has been made in assisting automotive after-market manufacturers to prepare more compact catalogs.

Boney states that, since this department was set up, more than 125 leading manufacturers have cooperated and have reduced the size of their jobber catalogs materially. Comparing 70 of the newer issues with the older ones shows a saving of 3047 pages, 19¼ lb. in weight and 5½ in. in thickness.

Joins Mack Board

Appointment of William S. Newell to the board of directors of Mack Trucks, Inc., has been announced by Louis G. Bissell, chairman of the Mack Board. Mr. Newell is president of Todd-Bath Iron Shipbuilding Corp. and president of Bath Iron Works.

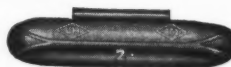
Keller Resigns

George D. Keller has resigned as vice president of The Studebaker Corp., according to Paul G. Hoffman, president. Keller has left South Bend for an extended vacation and at present his plans for the future are indefinite.

CALM DOWN M.P. I CAN STOP, I'VE GOT **SOUTHERN** BRAKE LINING

SOUTHERN
FRICTION MATERIALS CO. - CHARLOTTE, N.C.

"Unbalance" Ruins Tires!



**L & H
Balancing
Weights**

An unbalanced wheel causes a wanton waste of rubber, regardless of driving speeds. Send for wall chart that proves it.

**FREE
WALL
CHART**

HARLEY C. LONEY CO.
16893 Wyoming
Detroit, Mich.

FITZGERALD
GASKET CRAFTSMEN SINCE 1906
GASKETS

*The complete line
that completely satisfies*

The Fitzgerald Manufacturing Company
Torrington, Conn.

BALDOR

**ELECTRICAL SPECIALISTS
FOR 22 YEARS**

Manufacturers of
Electric Motors
Electric Motor Grinders
Battery Chargers
Fast Battery Chargers
Battery Testers

Write for Bulletin

BALDOR ELECTRIC COMPANY
434 Duncan Ave. ST. LOUIS, MO.

M. P.
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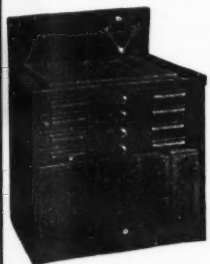


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AAA Asks Higher Mileage

Reappraisal of the whole tire and rubber situation to determine whether a higher mileage ceiling can be established to permit greater utilization of the passenger car in meeting the nation's over-all transportation needs is being urged by the American Automobile Association.

The action was taken in accordance with a policy statement adopted recently by the Executive Committee of the national motoring body at a meeting in Washington.

In addition to re-examination of the 5,000-mile mileage ceiling, the A.A.A.'s mileage rationing recommendations also called for extension of the validity period for "A" coupons, speed-up in distribution of tires acquired by the government through the idle tire purchase program, re-study of the 35-mile national speed limit and of the allotment of gasoline on the assumption that cars get 15 miles to the gallon, and granting of special gasoline rations for members of the armed forces on furlough or leave.

2000 Plants Tested

Nearly 2000 varieties of plants found in this hemisphere have been tested for rubber since March, 1942, by investigators of the department of agriculture at Cornell University, Ithaca, N. Y., it is announced.

The search for native plants as a source of natural rubber to replace supplies cut off by war was undertaken by Cornell Scientists working with the B. F. Goodrich Co., Akron, Ohio, which gave financial aid to the project.

A new quick process to indicate how much rubber and resins plants contain has been developed by the university researchers.

Most of the plants so far examined show rubber content too low for commercial use, but some contain sufficient resin to warrant further study.

What Car's in a Name?

Soldiers always are ready with a nickname.

Take the case of a cadet at the Nashville, Tenn., classification center. His name was Hudson F. Packard.

Naturally, the boys dubbed him "General Motors".

Then they found out what his middle initial stands for.

You guessed it—Ford.

OLD AUTOMOBILE CATALOGS WANTED FOR RESEARCH

A scientific museum wants authentic automobile catalogs and sales literature issued between 1890 and 1925. Will pay reasonable prices. Write full description to Museum, Dept. C, 140 W. Ontario Street, Chicago.

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